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# MOTOR AGE

Vol. XL  
Number 24

PUBLISHED WEEKLY AT THE MALLERS BUILDING  
CHICAGO, DECEMBER 15, 1921

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## Now a New Hudson Super-Six

*A Greater Car, and for Less  
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It is a more handsome car  
It starts easier  
It is improved in many  
mechanical features

It is more economical  
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Super-Six features  
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For six years, including last year when it cost \$2600, the Hudson Super-Six has been a leader for fine car sales.

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Hudson Motor Car Company

Detroit, Michigan

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**\$85<sup>00</sup>**

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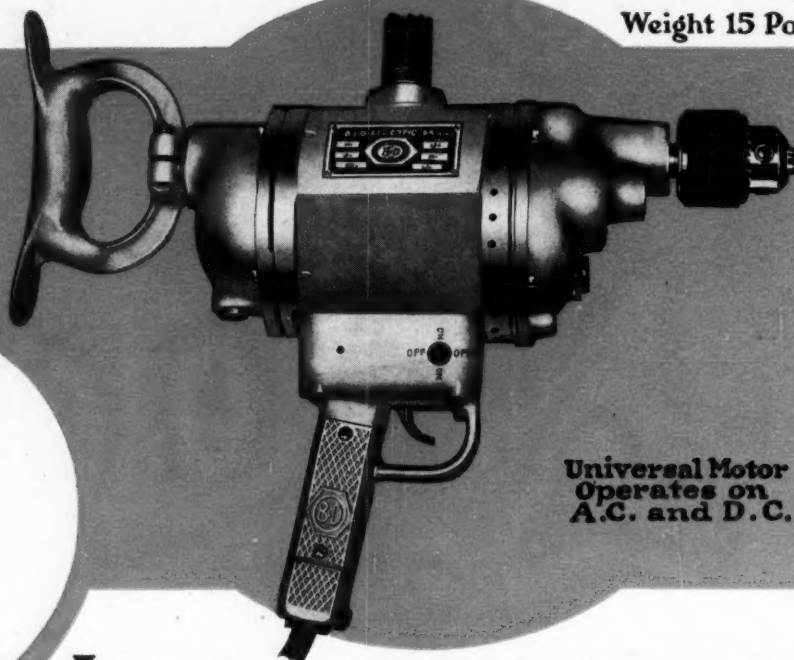
**\$10.91** Per Month  
for 6 Months

**1922 Model**

**1922 Price**

*"With the Pistol Grip and Trigger Switch"*

Weight 15 Pounds



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Operates on  
A.C. and D.C.



By removing two screws cover plate of switch handle may be lifted off, exposing terminal block to which electric cable and motor leads are attached by means of SCREW TERMINALS. Cable may be renewed quickly and easily without soldering.

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**L**IKE all BLACK & DECKER Portable Electric Drills this SPECIAL HALF-INCH DRILL is powerful, durable, comfortable to handle and perfectly controlled.

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THE BLACK & DECKER SPECIAL HALF-INCH DRILL fits the BLACK & DECKER BENCH DRILL STAND, or POST DRILL STAND, and can be secured from your regular jobber.

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NO LOAD SPEED—475 R. P. M.

NET WEIGHT—15 pounds.

EQUIPMENT—Drill is complete with 15 feet duplex electric cable, attachment plug, combination spade handle and breast plate, detachable side handle.

PRICE 110 VOLTS - - \$85.00  
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Can be supplied for 220 or 32 volts at small additional cost.

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# MOTOR AGE

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## Does Your Car Grumble at Hills?

A surprisingly large percentage of car owners would answer "Yes" if your service man asked them that question. And it's safe to say that about 80% of them could trace the trouble to carbon-choked motors. In most cases, a dose of

## JOHNSON'S CARBON REMOVER

would make their engines run smoothly and quietly and make them satisfied owners again.

Johnson's Carbon Remover is a harmless liquid that contains no acid. It has no action on any metal and does not affect lubrication.

If necessary, the car owner can use it himself. All he has to do is to remove the spark plugs, pour in a little Johnson's Carbon Remover—let the car stand a few minutes—then start the engine and the carbon is carried out through the exhaust.

You can make your customers satisfied car owners and make big profits by selling them Johnson's Carbon Remover for 80% of their engine troubles.

## S. C. JOHNSON & SON

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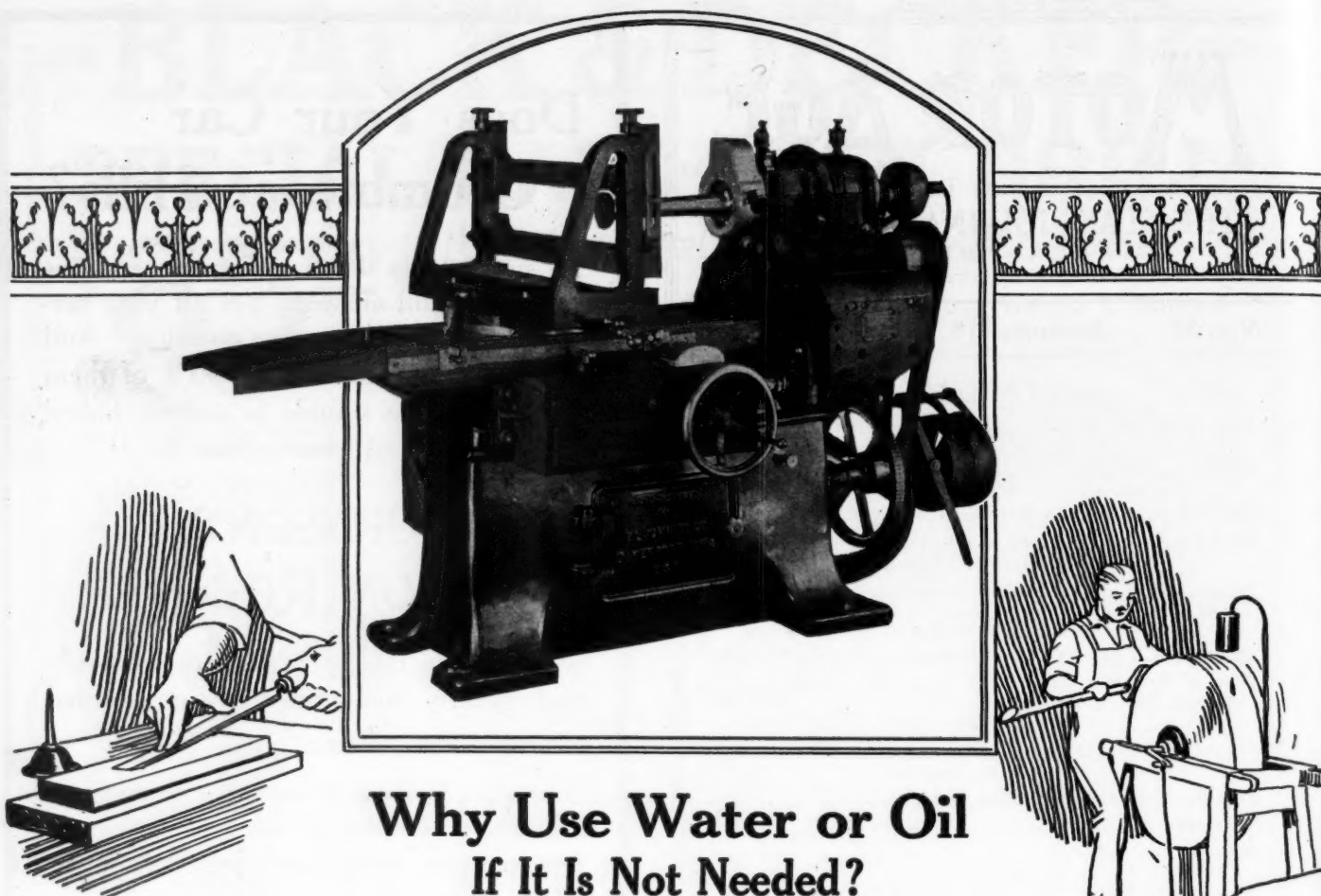
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## JOHNSON'S CAR SAVERS KEEP YOUR CAR YOUNG

Write for our Free Booklet. It contains valuable tips on Keeping Cars Young.



## Why Use Water or Oil If It Is Not Needed?

Why does a carpenter use oil on his stone when he sharpens a chisel or a plane blade? And why use water on a grindstone for an axe or scythe blade? Unless it is to produce a smoother edge, a finer cutting action, it seems that a dry stone or wheel is sufficient in itself to put an edge on.

The Micro Internal Grinder is a wet grinder. The water on the wheel leaves as smooth a surface in the cylinder as it is possible to produce by any means. All grit and metal washes out as it is produced—the metal in the cylinder is not heated to a damaging degree on a deep bite, and the regrinding job in general is more satisfactory.

The Micro Internal Grinder is a step forward from the present method of grinding—the wet feature permits of absolute accuracy with best possible finish—which is insurance of maximum service from reground bores. The best way to tell the difference between a dry and wet ground cylinder is to run your thumb nail over the work. Wet grinding proves its advantage in that one simple test.

**Micro**  
INTERNAL GRINDER

The large increase in the number of regrinding shops is an indication of profits possible in this line of work. Many repair shops have work enough of this kind to warrant immediate purchase of such a machine. If YOU have considered it, you need only to read a detailed description of the Micro grinder to assure yourself that it is the logical machine to use.

It is just a matter of deciding whether you want to install a machine that will give you the best results—a machine that has been five years in experimental stages—and is now recognized as the coming machine for cylinder regrinding.

Micro Internal Grinders are a better dollar-for-dollar investment than any tool of their kind. The results they give are far in advance of those possible with any other method, and one of them in your shop will bring dollars of profit into your pockets.

\*Ask for our detailed and illustrated descriptive folder, and ask us to tell you what we will do for you in getting you started in profitable business.

**B. L. SCHMIDT COMPANY**  
Davenport, Iowa





This is the service office in the Neel-Cadillac Co., Philadelphia, where the car owners meet the service salesmen. We tell more of this on the following pages. Note the new car on display and also the showcase containing fitments suited especially to the make of car

## The Customer Is Recognized as the Meal Ticket Here

**I**T WILL be remembered by readers that in the issue of November 24 this publication laid heavy stress upon in the importance of the customer. In this issue was reproduced in full the address of Norval A. Hawkins, which he delivered before the factory service managers' meeting in New York and in which he mentioned that service must be sold just like any other commodity.

**A** LONG this line it is interesting to see what the Neel-Cadillac Co., of Philadelphia, has done. This concern has put its business of selling service on the same basis as that of merchants in other lines. Look over the illustration above and try to recall how

many places you have been where service on automotive vehicles is sold after this manner.

**C**USTOMERS feel like coming into a place such as this. They are used to doing business after this fashion in the bank, music store or anywhere else. There is tone to the place. The dignified way in which the service salesroom has been planned engenders in the minds of customers the thought that here, at last, is a place where maintenance work on cars is looked upon and handled as a real business. Is it a wonder that the Neel-Cadillac expects to and will make money out of this two-million dollar investment?

# Satisfying Customers in a Two-Million Dollar Service Department

*This Organization Has Done What Others Will Have to Do Sooner or Later: Organize for Service, Equip for It, and Then Have a Place Other Than the Shop Floor to Sell It*

**S**ERVICING 3,000 Cadillac cars in Philadelphia alone and operating in a territory embracing seven counties in Pennsylvania, five in New Jersey and the whole state of Delaware, the Neel-Cadillac Co., Philadelphia, is meeting its extensive mechanical duties with a two-million-dollar service station.

The great number of car owners who must be satisfied entails particularly complete machine and tool equipment, a large force of workers and special arrangements to facilitate speed compatible with thoroughness. The flat rate system is not favored here, it being considered less fair to patrons in the long run; but there are certain specific operations in which it is used, such, for instance, as group lubrication, which will be explained further on; straightening rear axle housings and grinding cylinder blocks. Instead of the flat rate for general service, the customer receives at the outset an estimate which he has the opportunity of approving in whole, or only in part.

The company is striving to overcome the average car owner's somewhat unreasonable prejudice against appearing in person at a service station, by arranging so that its appointments are scrupulously clean and pleasing, and by frequently inviting him in and showing him that it is an instructive place to visit.

The company considers that it now has an ideal service station and wishes to have its patrons there from time to time, so that they may realize fully what is being done for their safety and convenience.

To this end, the roomy service office on the first floor is more in the nature of a "reception room" than ordinarily is found in service stations. There is a long counter at which the car owner meets one of several service salesmen, to whom he first makes known his wants. These employees, of course, are carefully trained and intimately familiar with all phases of servicing.

On this floor, at-

tractively placed, in plain sight of the entering customer, is always a brand new Cadillac car—not an ordinary demonstration machine—which is used during explanations to the car owner. This, time and again, has proved a distinct sales stimulus. Then, too, close to the car is a long display case filled with accessories. These are mainly Cadillac specialties and do not embrace a general line of automotive equipment, which is not kept in stock. Many Cadillac accessories are sold directly from this case and indirectly by its offered suggestions.

As soon as the customer has made known his wants to the service salesman, the latter sends for a tester and a conference of the three is held. The tester takes the car out for a short run and then advises the owner what he has found it requires. He next fills out a tester's card indicating clearly these needs. The customer then decides whether he will have everything done for his car that is mentioned on the card, or whether there are certain of these operations which he wants done, the rest to be let go.

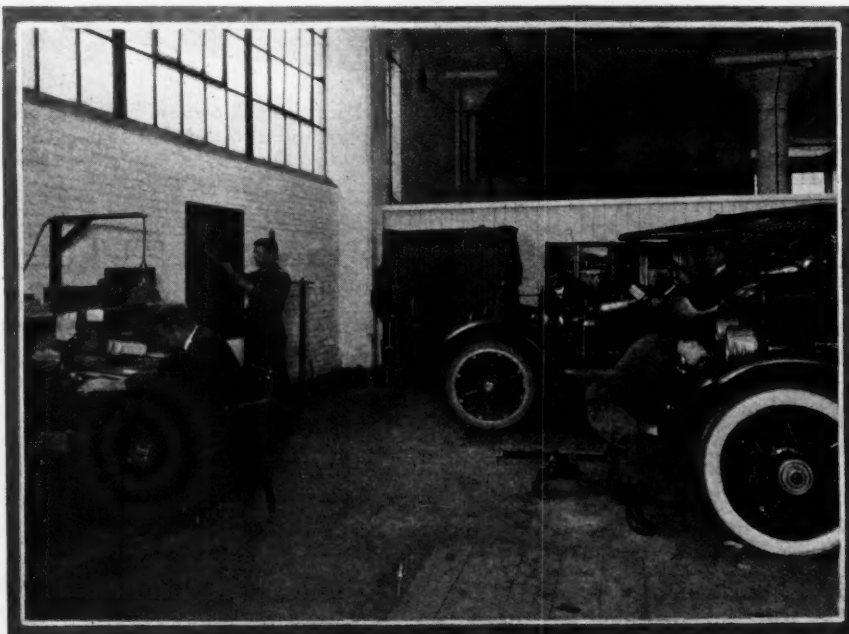
This procedure, of course, applies to a shop or "long" job and not to mere minor adjustments, which can be attended to without taking the car to the repairshop.

For the sake of both the customer and the job, the same

tester who meets the car owner at first retests the car after the job has been completed, being held responsible for the work he has advised.

The card which the tester makes out at first is given to an inspector at the time the car is turned over to the care of the shop. There is an inspector in charge of each section, appointed for that job by the shop foreman or his assistant. When the work on the car has been lined up, different men of the crew are assigned to do special work on it, and there is no further bother with writing up processes. The inspector of the work makes out a slip for each operation on the car for each man. He carries a small pad for this purpose. A time limit is placed

## The Job Must Be Right Before It Leaves Here



A corner of the test department of the Neel-Cadillac Co.'s two-million dollar service division. The same man who diagnosed the trouble when the car was brought in, tests it before it is delivered to the customer and is responsible for seeing that the work has been done right



NEEL-CADILLAC COMPANY

Owner \_\_\_\_\_  
Motor No. \_\_\_\_\_

### LUBRICATION RECORD

A. CRANK OIL B. GREASE CUPS C. TURN UP ALL D. OIL UP OVER & SPIN HOLES	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000	6500	7000	7500	8000
Crank Case Replace Oil	A															
Starter Gear Shaft Grease	C															
Grease Cups Turn up all	D															
Fan Bearing Oil	A															
Grease Cups Fill all	D															
Clutch Ball Race Oil	C															
Universal Joints Grease	E															
Brake Connections Oil all External	A															
Steering Wheel Hub Oil	A															
Spark and Throttle Connections, Oil	A															
Air Compressor For Tires, Oil	A															
Oil Caps and Holes Oil	A															
Engine Supports Oil	A															
Transmission Fill to Level	B															
Rear Axle Oil to Level	B															
Steering Gear Oil	B															
Distributor Grease	C															
Valve Stem Oil	A															
Wheel Hubs Oil	A															
Oil Pan and Screen Remove and Clean	A															
Transmission Clean and Refill	B															
Rear Axle Clean and Refill	B															
Oil Internal Brake Connections	B															
Wheel Bearings Clean and Re-pack	B															
Speedometer Mileage																
Date																

This chart used by the Neel-Cadillac Co. takes all the guesswork out of keeping its customers' cars properly lubricated. More complete details of the operation are given on this page and are well worth the study of any service executive, large or small

on each separate job.

There is, of course, a record for each car and every operation on it, showing the experience with it of both the owner and the company. This is known as the service record form and is much like those used in nearly all large service stations. The record shows the date of delivery, the motor number, the nature of the work previously done on the car and its mileage. Owners are urged by the company to make use of this record system.

#### Notable Lubrication System

Another important record is the lubrication form. The company especially prides itself on its lubricating system, which has essential differences from the system in operation in most other service stations.

The company proceeds on the plan that efficient lubrication is the foundation of good service for any car, and that more serious defects arise from neglect of proper oiling and greasing than is generally realized among owners. There is a special oiling and greasing department on the second floor, in which a force of boys works under the supervision of an expert lubrication inspector, who reports to the service office. "It is surprising what these oiling boys discover in their work," said J. B. Dickson, superintendent of service. "The idea is to develop them into experts so that when they are ready, they may be given other important specific duties. The inspector regularly checks up their work, and there has sprung up among them a strong rivalry to see who will accomplish the neatest and best lubrication job. Once a week a meeting is held, at which these boys report what they have learned in the course of their work. Sometimes these statements are decidedly instructive."

A lubrication record form of each car is kept. This is, in reality, a chart for oiling and greasing, covering a period of one year. The chart is divided into four groups or blocks, and is filed by the car owner's name, under which the motor

number is given. There is a flat charge allowed for Group 1, which consists of the following operations:

Replacing oil in crankcase; greasing starter gear shaft; turning up all grease cups and oiling fan bearings.

The operations for Group 2 are:

Filling all grease cups; oiling clutch ball race; greasing universal joints; oiling all external brake connections; oiling steering wheel hub; oiling spark and throttle connections; oiling air compressor for tires; oiling oil cups and holes and oiling engine supports.

Group 3 covers the following:

Oiling transmission to level; oiling rear axle to level; oiling steering gear; greasing distributor; oiling valve stems and oiling wheel hubs.

The processes for Group 4 are:

Removing and cleaning oil pan and screen; draining and refilling transmission; oiling internal brake and draining and refilling rear axle, and cleaning and repacking wheel bearings.

The owner may pay for lubrication by the group flat price which, for the year, or 8,000 miles, would amount to a little more than \$100. Small spaces at the top of the form, for guiding checking marks, show what lubrication is administered for every 500 miles run. The last space is for 8000 miles. At the end of every 4000 miles run, the wheels of the car are removed and a most complete lubrication is administered. The speedometer mileage and date are taken for record. A lettered "key" shows what kind of oil and grease are used for the various mechanisms.

General mechanical repairs on the customer's car are made on the third floor, which is reached by two large electrically operated freight elevators. An overhead trolley system, circling the repairshop floor, enables whole cars and heavy parts to be lifted so that the men may work on them from beneath, or to be moved to any section of the shop.

The machine shop, which is divided from the rest of the repairshop by heavy wire gratings and a wire door with spring lock, contains notably good large and small equipment.

#### Shop Stock Is Centralized

The machine tools on this floor include three high-speed lathes, three large drill presses, one surface grinder, one No. 60 Heald cylinder grinder, two small grinders, one planer, one shaper, one cylinder boring machine, one milling machine, one welding outfit, two arbor presses, one riveter and one universal connecting rod bearing scraper. There are scores of small tools, many of which were made in the very complete blacksmith shop, also on this floor, where frames and axles

### Just Selling Service Intelligently

**C**USTOMER, on entering the Neel-Cadillac service department, holds conference with service salesman and tester.

Is asked to examine new car on floor in service office during the explanation of points he wishes information about, this proving a distinct sales stimulus.

Large display case of Cadillac parts placed near this car for his observation.

Gets estimate of work to be done on car at once, so he can approve it, as a whole or in part.

Shop stock centralized in repair department to lessen number of steps.

Work routed and divided among men to make speed compatible with thoroughness.

Lubrication made a specialty. Work done by force of boys under inspector's supervision. Meetings of boys held and good-natured rivalry in excellency of work stimulated.

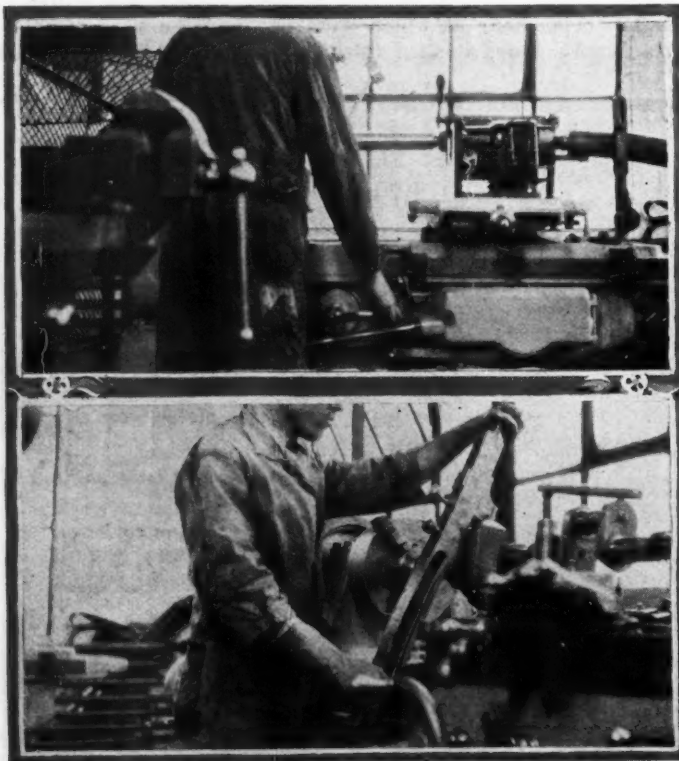
Usual lubrication chart employed, divided into groups whereby car owner may pay flat rate by the group, if he wishes.



Some of the machine tools in the service department of the Neel-Cadillac Co. The equipment is most complete and expert machinists are employed. Cleanliness is strictly maintained here as in all other departments and the large windows flood the room with light

are straightened and the other heavy work is done. A tri-block hoist, operating on an I-beam and a cleaning rack, where bodies are prepared for thorough cleaning, are among the facilities on this floor.

The work is routed in the shop in such a way as to save as much time and as many steps as possible.



Top—Grinding a cylinder block in the Neel-Cadillac Co. service department. Below—Truing a crankshaft bearing surface with crankshaft turning tool having micrometer adjustment

To this end there is a shop material room, 23 feet square, partitioned off by wires and locked in the center of the floor. Here are concentrated the materials used in the work of repair, including nuts, bolts, oils and greases. A set of dumb waiters connects the shop with the parts department on the second floor. Parts and material not kept in the shop stock room are received by the material clerk on the third or shop floor. To obtain material from the central stock room, a requisition is issued to the workman by job number. When the workman returns with the material, a clerk signs the requisition as a receipt therefor.

There is, of course, a certain department, or section, for each type of work, and certain men always do the same kind of work, this uniform plan speeding up all jobs.

In the machine shop proper, all brakes are relined; carbureters overhauled; drive axles fused and machined; clutches refaced; cylinders ground, and crankshafts turned. It is for such jobs as these that stock is taken from the shop stock room in the center of the floor. But an inspector must see every requisition, and the need for the material must be shown. The shop, which has a southwestern exposure and possesses notably fine daylight facilities, occupies two bays, or 1058 sq. ft. The large machines are lined up into two rows, with a row of benches between, so the men can work on both sides.

#### Interesting Grinding Operations

Let us take the operation of grinding cylinders—one of the many processes in which this shop is known locally to be a leader—as an example of routing the work. To begin with, the Neel-Cadillac Co., through a distributor, maintains factory standards in its work, buying all pistons direct from the Cadillac factory. As soon as the cylinder block has been removed from the owner's car, it is taken to the machine shop to be ground on the No. 60 Heald cylinder grinding machine. If it has never been ground before, it is ground to standard first oversize; but if it has been previously ground, it is ground now to standard second oversize.

The workman, on having his requisition passed, draws from stock a set of corresponding sized pistons with rings and wrist pins, purchased from the factory. These are fitted up on rods and rods and pistons are lined up on mandrels by means of a micrometer gage, so they will be in perfect alignment. As



soon as they have been lined up, they are delivered back to the inspector of the job, the time of the workman going into a flat rate in the job—that is, the charge is made at a flat rate to the job.

The processes at the grinding machine consist of setting up the block, connecting the flexible metal hose with the blower which carries all dust from grinding out of the window, centralizing the grinding wheel which is fastened on an arbor 2¾ in. in diameter, and grinding. A Norton abrasive wheel of 30-grain type, having a diameter of 3 in. and a face of ¾ in. is used, applied to the work at the rate of 7200 r.p.m. The Heald grinder, on which it is used, is capable of accommodating work 3 by 4¾ in. The grinding takes about half an hour to each hole. The cut of the wheel in the cylinder block can be trued up. There is a diamond wheel for trueing on the face of the traveling bed plate.

Another interesting grinding operation performed in this shop is that of tooling up crankshaft bearing surfaces and the fillet of the pin to thousandths of an inch, by means of a Weber crankshaft turning tool having a micrometer adjustment at the top and provided with blades of varying size for bearings of different widths. The turning tool, which is about 2½ ft. in length, gives a perfect, polishing cut. The tool is mounted on a lathe, the work being held either between centers, or between a true chuck and a center in the tail-stock.

In the stockroom on the second floor is carried a complete line of Cadillac parts. This is operated under the "Kardex" system, whereby every part has a symbol corresponding with that in the parts manual, a number and a designation showing the year in which it was made or issued.

#### Make Keys for Owners

The card, so made out as to last from the first of the year until the next inventory time, contains in its lower margin the same information as appears at the end of each parts bin—in other words, the serial number, symbol, year, name, maximum and minimum, location, card number, date of price change, price and cost. On one part—a universal joint—there has been no change since 1911.

There are uniform rows of these steel parts bins, most of them ten tiers high, each row being a section. The heavier parts are in large bins in the lowest tiers. There are racks for wheels and rims, and large, tiered racks for fenders.

There is a small machine with dies for reproducing owners' car keys on this floor. This has been found a great convenience, as oftentimes an owner will lock his key in his car when he parks it. In a corner of this floor is the warranty department for all new cars, as well as the electrical department, with which is also connected the electrical department controlling the lighting, telephone and other electrical needs.

On the fourth floor are the trim, paint and body departments, where the coach work is done. There are two dust-proof varnish rooms, from which six cars can be turned out daily—three from each room. In trims, the company specializes on "tailor made" jobs and it builds slip-covers that actually fit—a very different proposition from some ready-made ones. Monogram and crest work here are done by hand, there being no stock types in these lines. Wood and metal work are skillfully done here, and the workmen can close up a broken panel so that only an expert could discover the damage, and then only on close inspection.

### The Why of Proper Equipment

THE foregoing article has dealt largely with equipment for the service station. For the service station which intends to win the respect of its patrons, too much cannot be said about the value of proper equipment.

There still are too many shops in the country trying to get along on too meager a line of machine and hand tools. Equipment very often will change the very nature of a repair job. It will result in a saving to the car owner, to say nothing about the prestige a shop gains when its customers are sold on the fact that repair operations have been put on a business-like basis through good equipment and methods.

Take the case of a Cadillac, recently. A service man had told the owner of this car that it would become necessary for him to purchase an entirely new set of sixteen valves for this car. However, he took the car to another service station for an examination and this shop was tooled up so that it could handle practically any sort of job outside of gear cutting. The shop reclaimed fifteen of the sixteen valves and it was thus only necessary for the customer to purchase one new one. The fifteen valves were reclaimed in 19 minutes. It does not take much imagination to picture the content of this customer when he was shown that by modern machinery adapted especially for the service station, it was able to reduce what in most cases would have been a very high bill. And incidentally the job was as good or better than would have been the case had new parts been fitted, because the old parts having been subjected to heat for a long period would be less apt to change shape after the machining.

Good equipment will go a long ways toward the bettering of service, but it is just as essential that this equipment be managed by men who know their business. Instruments capable of registering to the half thousandths part of an inch are only useful to the extent in which the operator can interpret these figures to any particular job. Precision tools and methods in the hands of competent men are largely the answer to most of our so-called service and repair problems.



Left—Warranty department where new cars are tested and checked for full equipment before delivery. Right—Oiling and greasing department on the second floor of the Neel-Cadillac Service building in Philadelphia

# Mitchell Brings Out New Engine

## Model F-50 More Powerful Than Predecessor

**M**AXIMUM power at low engine speeds, economy and smoothness of operation at moderate driving speeds are the things to which preference has been given in the new Mitchell engine, known as the model F-50. Much of this has been secured through the general design, paying particular attention to the proper handling of the fuel, oiling system, careful balancing of the crankshaft and reciprocating parts and the methods of production.

The general specifications include a single L-head fine texture iron block with six cylinders  $3\frac{1}{2}$  in. bore by 5 in. stroke, with a removable head. The S. A. E. rating is 29.4 hp., while on the block test the engine has actually shown over 50 hp. The piston displacement is 288.6 cu. in. The crankshaft is statically and dynamically balanced, and has force feed oiling to the main bearings, of which there are three.

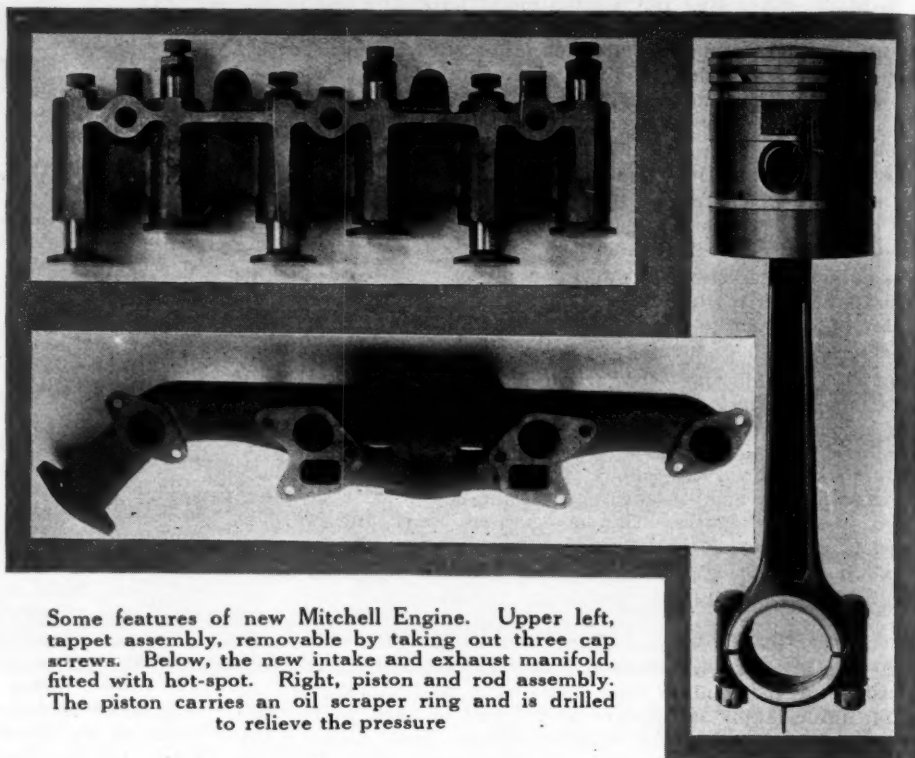
These bearings are respectively  $2\frac{3}{4}$ ,  $2\frac{3}{8}$  and  $3\frac{1}{2}$  in. long by  $2\frac{1}{4}$  in. in diameter. The connecting rods, camshaft and its bearings, gears and piston are oiled by a constant level splash system. Cooling is by pump with a Fulton thermostat to lessen the warming-up period and insure the correct temperature.

### Novel Feature of Combustion Chamber

In bringing out its new engine, the Mitchell company has not overlooked the importance of accessibility. The exterior of the engine is very clean, especially the right side, there being placed on this side only the starting motor, breather and filler pipe and the water inlet connection.

In laying out the carburetion system, one of the chief points considered was the proper handling of current quality of fuel with its heavy ends. A new intake manifold has been produced which is fitted with a hot-spot located in the direct travel of the vertical feed. This superheats the gas, which, by virtue of carefully designed passages and bends with long sweeps, is maintained at the proper temperature and supplied to all six cylinders in a uniform flow at all speeds. Thus, there is no tendency of the heavier ends of the fuel finding their way into the cylinders at the end of the block. The design of the carburetion system is such that no chance is given the gas to condense once it has been converted from the raw fuel.

Among other points of interest on this new engine is the combustion chamber. As will be noted from the sectional view, the spark plug has been located in a spot where there is a relatively large



Some features of new Mitchell Engine. Upper left, tappet assembly, removable by taking out three cap screws. Below, the new intake and exhaust manifold, fitted with hot-spot. Right, piston and rod assembly. The piston carries an oil scraper ring and is drilled to relieve the pressure

volume of gas. After the gas is ignited it is thrown with a wedging action upon the top of the pistons. This readily will be understood by reference to the illustration, which clearly shows the wedge-shaped space. It also will be noted that the combustion space has been designed to extend well beyond the valve heads opposite the cylinder bores. Thus when the valves are open there is a better chance for the maximum amount of gas to get in and out of the combustion chamber.

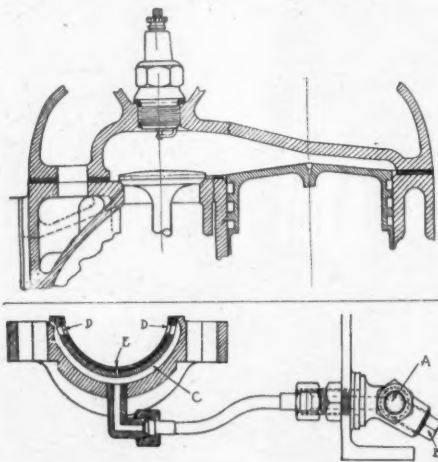
On the left side are mounted the inlet and exhaust manifolds, valves, carbure-

ter, generator and ignition and the oil leads. While there are quite a number of units on this side, they have been placed so that it still is possible for a mechanic to adjust the valves quite easily. The bottom of the crankcase is of pressed steel and its removal gives access to all bearings, no special shaped wrenches being required to reach the main bearings in the ends of the block.

Much care has been given to the piston and rod assembly. The piston is interesting in that it is very flexible. It is made of iron, but is extremely light, it being possible to squeeze it into a slightly oval shape by hand. The thought here is to get a piston which will readily adapt itself to the shape of the cylinder bore.

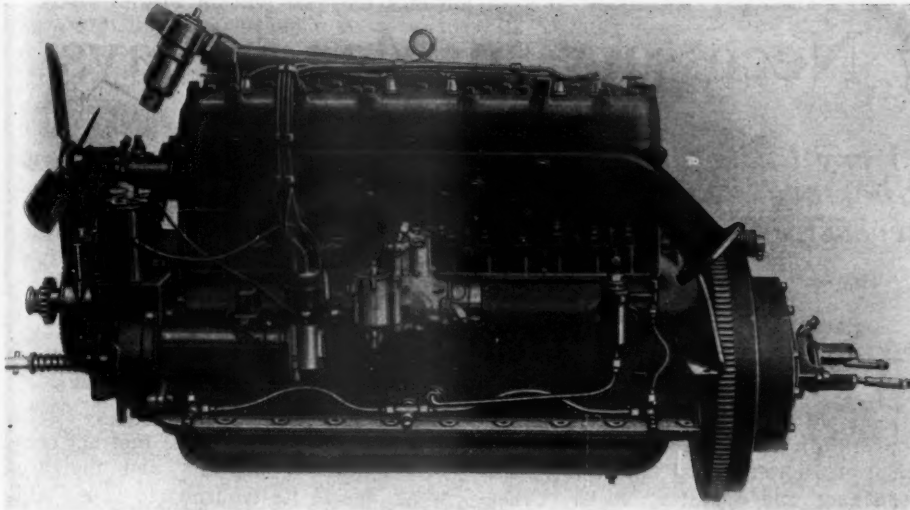
Three compression rings are used and one oil scraper ring. The top is slightly conical and is finished by polishing. The material of the top is  $\frac{1}{8}$  in. thick. A number of  $\frac{1}{8}$  in. holes equally spaced around that portion of the piston between the two bearing surfaces are drilled to relieve the pressure. Two flats are cut into the piston immediately above the piston pin on each side and a  $\frac{1}{8}$  in. hole drilled at an angle of 25 deg., through which oil scraped into the flats by the ring above is forced into the piston pin bearings.

Much has been done to give to the gases the easiest possible flow in and out of the combustion chambers. The water spaces around the valves have been substantially increased. The valves are  $1\frac{1}{2}$  in. in diameter in the clear and have a lift of .275 in. The tappets have been



Top—Novel shape of combustion chamber on Mitchell engine. The other view shows an oil lead to main bearing. A, main oil pipe; B, drain; C, oil compartment back of bearing; D, slot running almost entire length of bearing; E, small hole for oil





Left side of Mitchell engine. Note the exterior oil pipes going to the main bearings. The pump is accessible, as are the other accessories

lengthened and are held in removable guide blocks. It is necessary to remove three horizontally placed cap screws from each assembly of six tappets, whereupon the guide block and tappets can be removed as a unit.

#### New Counterbalanced Crankshaft Introduced

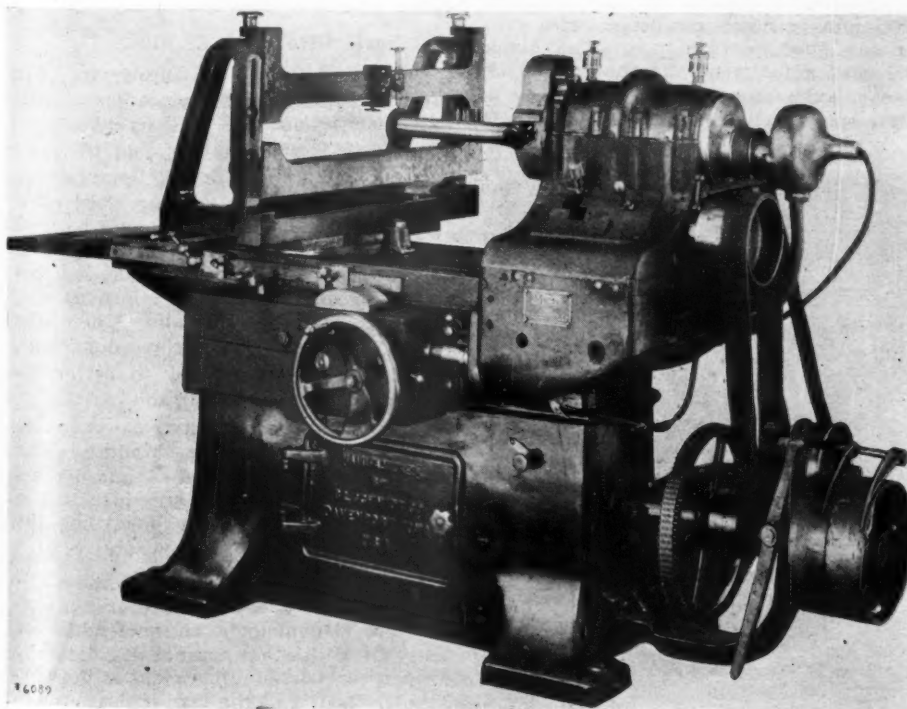
A new counterbalanced crankshaft is now used and this is balanced to within .005 in. on the three main bearings when

the shaft is turning 2000 r.p.m. With the shaft supported at both ends and turning at that speed the middle bearing is balanced to within .003 in. The shaft is very stiff and, with the pressure system of oiling, it is possible to get a high linear speed on the bearings.

The lubrication system has been worked out very well, particularly in the matter of oiling the main bearings. A cross sectional view of the center-bearing is shown in one of the accompanying

illustrations. From this it will be noted that the oil is fed to the bottom of the bearing by a cross line which is connected to the main distributing line on the exterior of the engine by means of a T. The oil is carried behind the bearing metal in the cap and emerges through two small holes located in the upper end of the bearing near the dividing line. The holes are located on opposite sides and in a channel extending almost the entire width of the bearing. These channels, therefore, form a reservoir from which the oil is fed to the revolving shaft over the entire width of the bearing, which, it is stated, is not always so when the oil channels in the bearings are cut from one side to another and crossed in the center. The upper half of the main bearings is oiled by splash, the oil collecting in suitable pockets formed integrally with the crankcase webs which carry the bearings.

The camshaft is oiled by splash, suitable pockets being cast above the bearings and arranged with curved baffles which help throw the oil into the pockets. One of the features of the oiling system is the manner of attaching the outside oil leads and the drain arrangement. The connections between bearings are made by copper tubing, each section being made with a rise and fall. This allows for any variation in length, and makes it possible to drain any of the leads without affecting the others.



### Micro Internal Grinder

THE range of this machine is from  $2\frac{1}{8}$  to  $8\frac{1}{2}$  in. diameter. The machine is regularly equipped with a 13-in. spindle, but can be furnished with 19-in. spindle at the option of the customer. The grinding is done by the wet process, the claims of which are: prevention of distortion by keeping the work cool;

prevention of surface breakdown by keeping the wheel cool; the securing of a much better finish or "glaze." The base is heavy and rigid. Belt or motor drives are connected to the same mounting on the base, and no countershaft is necessary.

An interesting feature is the diamond

dresser, which is shown in the illustration mounted on the parallel bars of the machine. This permits quick and accurate judgment to the surface of any sized wheel. All bearings are adjustable for wear. The spindle head has two speeds, 36 and 62 r.p.m. The action of the table is automatic, but can be started and stopped by hand by means of a clutch throwout lever.

The reversing dogs are movable to any position on the rack and are provided with superfine adjustment for use when grinding closed in blocks. The length of the table over all is 48 in., with a width of 19 in. and a travel of 31 in. The pump mounted on the inside of the base draws solution from the clarifier and delivers it to a control valve. From this valve the solution is led through flexible tubing into the water slinger on the end of the spindle.

The water solution is then conducted through the housed spindle to the wheel, where it is delivered to the point of contact between the grinding wheel and the work. The clarifier removes all grinding sediment from the wheel before it is delivered to the pump for recirculation. The main spindle housing is carried in bronze bearings of 7-in. diameter and 3-in. length. The spindle proper is constructed in two halves, each half carried on its own ball bearing, which tends to eliminate whip and vibration. The total net weight of the grinder is 4600 lbs. The Micro wet grinder is manufactured by B. L. Schmidt Co., Davenport, Ia.

# Fuel Economy Necessary in Many Ways

*While There Is Very Little Probability of a Permanent Motor Fuel Shortage, Strict Economy Must Be Exercised — Increasing Fuel Costs Strengthen Sales Resistance*

By HERBERT CHASE

**T**HE meeting of the American Petroleum Institute, held in Chicago last week, was significant in that it was the public gathering in which representatives of both the automotive and petroleum industries took an active part. Many problems which confront both industries were discussed and it was quite generally agreed that these problems can be solved only by co-operation of both parties.

Much was said regarding those things which control the important part which fuel plays in determining not only the sale but the efficient and satisfactory use of automotive vehicles in the hands of the public. Fuel and lubricating oil supplies constitute considerable items of expense in vehicle operation and are destined to become larger items in the near as well as in the more distant future. It was often said at the meeting that both industries should aim to give the greatest number of miles per dollar with minimum trouble to the user, and the part which service organizations play in this regard was repeatedly mentioned.

## Why Economy in Fuel Is Important

There is a quite general impression among service and other men in the automotive world that there is in this country a practically inexhaustible supply of petroleum from which motor fuel is derived. This is far from being the case. The fact is that the consumption of oil in this country has for several years exceeded the domestic production. To date this gap has been filled by imports from Mexico. Present Mexican fields have been phenomenal producers, but most of the wells in these fields have already ceased to produce and many qualified judges believe we will receive but little more oil from Mexico in the next few years.

Since we received some 20 per cent of our oil requirements from Mexico last year, the cutting off of exports from that country may result in a temporary stringency. New fields will doubtless be found in Mexico as well as in this country and in other parts of the world, but the fact is that in spite of great incentive, the production from newly discovered fields in this country has for several years failed to keep pace with the increase in demand.

It seems safe to say that we shall never have a permanent motor fuel shortage, but there is utmost need for

economy in the use of remaining resources, for fuel will certainly increase in price and thus tend to increase sales resistance and operating costs. Consequently, it will pay us all to do whatever we can toward increasing the number of miles per gallon that cars and other vehicles travel.

## Saving Fuel Now Wanted

It has been conclusively proved by the Bureau of Mines and other tests that the average car of today fails to burn 20 to 30 per cent of the fuel taken into the cylinders. This is due in part to over-rich mixtures and poor distribution. It is not always easily prevented, but the loss is just as real as if one quart out of every gallon put into the fuel tank was allowed to leak out before it reached the carburetor.

Carburetors should be adjusted for maximum economy consistent with reasonably good performance. The quick and easy adjustment and the one which gives maximum power and flexibility is often one which is much richer than it

should be for maximum economy. Such a mixture not only wastes fuel but often causes carbon deposits and increases wear, due to its tendency to cause dilution of lubricant in the crankcase. A more economical mixture often gives almost equal performance, reduces the carbon and dilution troubles, and saves fuel and money for the owner, which far more than repays the slight sacrifice in performance, and even this is not always sacrificed.

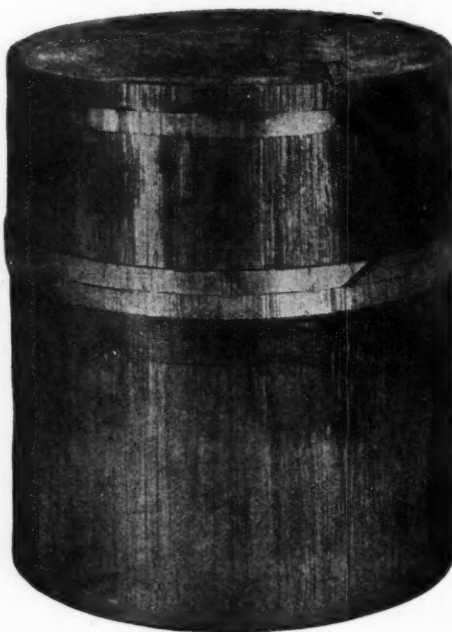
The service man should always encourage the use of economical carburetor adjustments, and if not able to make them himself (it is often a very difficult job), should recommend that his customers go to the service station of the carburetor maker, if one is maintained near by. If well done, such a service is appreciated by the owner and results in other valuable business.

## Hot Spots Give Good Results

On older cars air-heating devices can often be applied to advantage where none exist, while hot spots of the replacement types and manifolds can frequently be secured and used with excellent results. This is true particularly on Ford cars. New carburetors can and should be used when the one fitted cannot be adjusted to give economical performance, but this should be done only when improved performance is assured and when the change is made by experienced persons, for it is not always easy to better the equipment furnished with the car.

Leaky float valves often cause waste of fuel when the car is standing. This should always be remedied and an accessible cock should be provided in the fuel line to shut off the gas when the car stands for long periods.

The use of extra air valves and similar devices between carburetor and engine are seldom to be recommended, for they do little that cannot be done by proper carburetor adjustment if the carburetor itself and the manifold are properly designed. In that case it would be better to secure a better carburetor and manifold than to apply a makeshift. Devices placed between carburetor and engine usually depend upon a new carburetor adjustment for bringing about the advantages claimed, and such adjustments are frequently quite as effective without using the device at all. The same can be said of pills and like dope added to the fuel in minute quantities.



Most car owners use more fuel than necessary. This not only is wasteful, but results in much damage to the engine. Notice the piston above. The scores in this piston are due to too much use of the choke. The engine was primed so much that raw fuel cut the oil film on the cylinder wall and made the parts run dry. Poorly seating valves are wasteful of fuel as is also an engine in which one or more cylinders misfire.



Many factors outside the fuel system have a distinct bearing upon economy in fuel consumption. A clean engine with tight valves and well-fitting (but no overtight) pistons and rings and dependable ignition are highly important.

#### Other Economy Factors

Good lubrication throughout the car is most desirable. Oil, especially in gear boxes and rear axles, not only lubricates well but creates less friction, due to churning the grease.

Brakes should always be adjusted to prevent dragging—a thing too often neglected and sometimes almost impossible because of poor design, but none the less important. This adjustment saves the linings.

Parts must, of course, be in good alignment to perform the functions with minimum loss of power. Misalignment causes friction, and friction wastes power and should consequently be minimized.

Perhaps the greatest and least appreciable loss due to friction is that which occurs in the tires themselves. It is seldom spoken of, but is none the less real. It is manifest in heating of the tires in spite of the fact that they revolve in the air and would otherwise keep cool as a result of the air circulation about them.

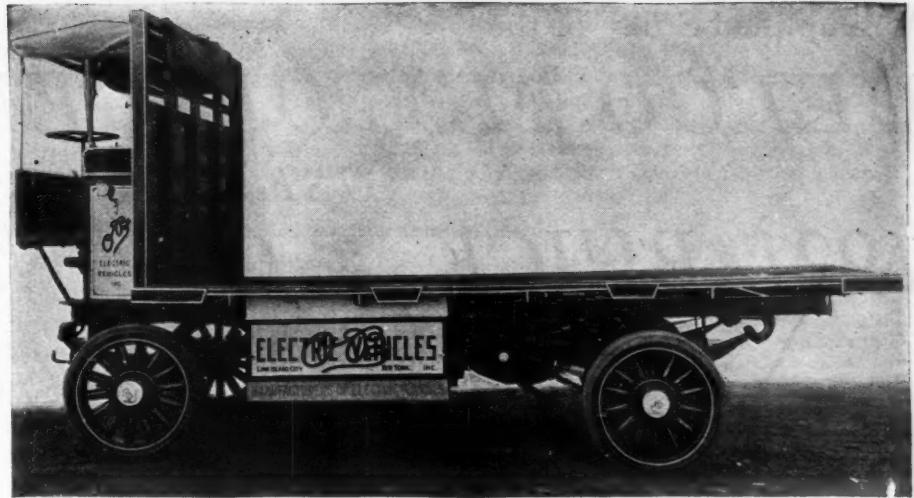
This heating is largely due to interval friction in the rubber and the fabric resulting from flexing and kneading as the tire is compressed between the wheel and the road. The loss is minimized by keeping the tires properly inflated, and is much less in cord than in fabric tires. This fact should be more used in urging the sale of cord tires. In some cases their use has been known to result in a ten per cent saving in fuel, a fact which, together with their other merits, should result in their wider use.

#### Encouraging Economy

In these days economies in operating costs counts. They should be encouraged by all possible means, and especially in relation to fuel, which is a national resource of the first importance. A car which uses three gallons of fuel a day 300 days a year costs the user \$270 annually for fuel alone. In many cases one-third to one-half the fuel used could easily be saved.

This is a valid and a very useful argument for the service station owner to employ in urging economy and one upon which he can properly realize in a business way, if he provides intelligent service which results in the saving. A sale which is profitable to both the reader and the purchaser is the only kind which pays in the end. Such sales can be made on the basis referred to and should prove highly profitable to all concerned.

The situation with respect to lubricating oil is even more critical in some respects than that of gasoline, so far as the potential supply is concerned; consequently, there is great need for preventing waste. This can be done by stopping leaks from cranks, gear-boxes, axles and the like, by keeping the pistons and rings well fitted to minimize pumping, and dilution of the oil by fuel.



### A New Make of Electric Truck

THE most interesting feature of the O. B. electric truck is a new method of control which permits of very gradual starting, and of speed variation by imperceptible steps. It has been brought out by O. B. Electric Vehicles, Inc., Long Island City, N. Y. The firm will manufacture a complete line of trucks. All of the four models (1, 2, 3½ and 5-ton) are designed along the same lines.

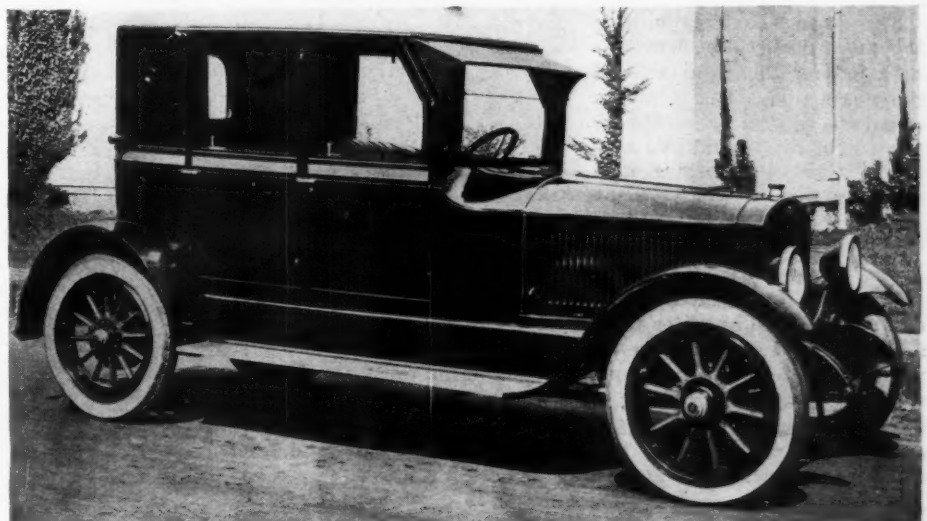
These trucks are equipped with single G. E. motors which drive through a silent chain running in oil, to a countershaft or differential shaft, from the ends of which the power is transmitted to the rear wheels by roller chains in the usual manner. The frame is made of rolled steel channels with the open side outward, which permits of securing brackets and other fittings to the inside with comparative ease.

The spring hangers, which are riveted

in place, are developed in the form of frame corner pieces. The two side rails have their ends bent at right angles so as to form one half of each end cross member, and they are joined together by fishplates inside and out, and rivets. The main frame members thus are identical in form and therefore interchangeable. This principle of making parts on the right and left hand sides of the truck exactly alike and interchangeable has been followed throughout the design, and materially simplifies the service problem.

The wiring from the battery to the motor and controller is carried in conduit in the frame channel on the outside. The wires are laid in grooves cut in two boards, which are placed with the grooved sides together. These boards are placed into the frame channel and the whole is then protected with a sheet metal cover.

### The New Stanley Four-Door Coupe



THE new Stanley four-door coupe has capacity for four passengers. Custom-built lines are effected by the manner in which the top of the windshield is sloped back and enhanced by a sun shade. A distinctive white line graces

the body from cowl to rear. The folding top of the old carriage builder's art and the shortened body effect over the rear wheels lend a dignified atmosphere. Price, \$3850. Stanley Motor Carriage Co., Newton, Mass.

# A Simplified Study of the *DELCO MOTOR GENERATOR* USED ON *1921 BUICK 4 CYLINDER CARS*

*The Diagrams Are Specially Prepared to Make Them Easily Understood—Study and Save These Valuable Articles*

By A. H. PACKER

## ARTICLE THREE

**T**HE electrical system that will be described in this article is the one used on the four-cylinder Buick car, which is almost identical with the system that is used on the six-cylinder model. One difference is noted in the location of the commutator and brushes, which on the four-cylinder car are at the rear where there is less chance of oil and grease getting on them, as they are at the opposite end of the armature from the distributor drive gears and the lubrication in which they run.

The design of the ignition and lighting switch is also different, although accomplishing the same general results, so that if the operation of this system is thoroughly understood, it should be equally easy to handle the system on the six-cylinder model.

### General Principles of Operation

The main electrical unit is the motor generator, which is mounted on the right side of the engine, and has a single armature, which by means of two commutators and two separate windings operates first as a starting motor; then, as the engine speeds up, it functions as a generator. Mounted at the front end of the motor generator, and driven by a spiral gear on the motor generator shaft, is the interrupter distributor, which, using an induction coil on the dash, operates to use battery current, stepped up to a much higher voltage to produce the sparks at the spark plugs. Fig. 5 shows the general principle of the drive which uses the intermediate gears at the rear to connect the motor to the flywheel when operating as a starter, and uses the generator clutch at the front to enable the pump shaft to drive the armature when operating as a generator.

### Car Wiring

The electrical circuits are shown in Fig. 1, which indicates both the external and internal connections. The negative battery terminal is grounded to the frame by means of a heavy cable, and the positive side of the battery goes by another heavy cable to the large motor terminal. No current can flow through the motor, however, except when the starter pedal is operated, which acts not only to shift the gears

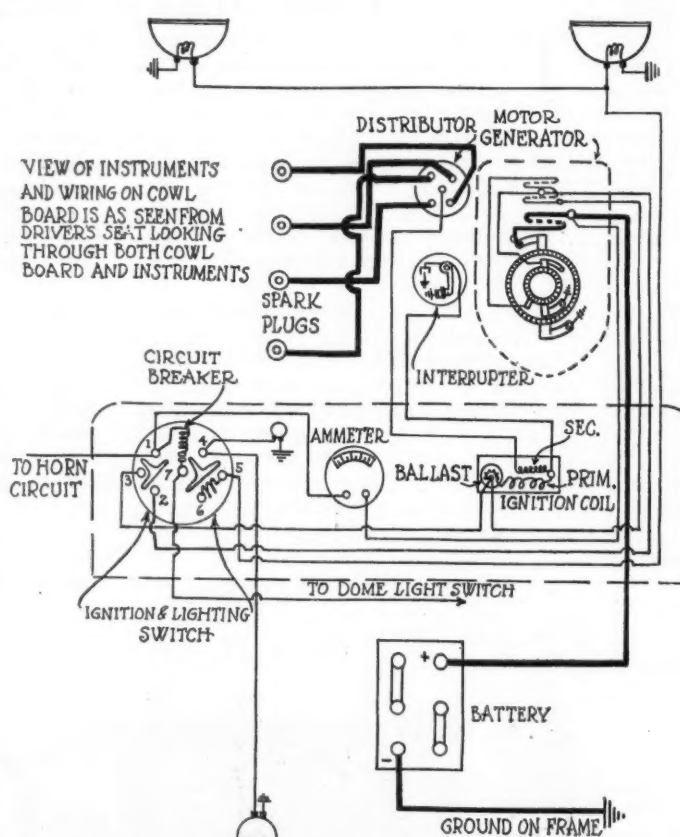


FIG 1 WIRING DIAGRAM BUICK-4-1921

into mesh with the flywheel, but also operates a rod that allows the upper starter brush to drop onto the commutator. The starter circuit is then complete through the series field, the upper brush, the armature and the lower brush to ground and back to the battery. The normal position of the starter brush, however, is up in the air, off of the commutator, where it is held by the brush operating rod.

In connection with the large terminal in the motor is a smaller terminal to which another wire is attached, which carries positive battery current to the right side of the ammeter, and from the other ammeter terminal a wire leads to the No. 1 terminal of the ignition and lighting switch. From the No. 1 terminal a wire leads to the horn, and from the horn a wire goes to the horn button, the operation of which completes the circuit to ground.

All current for the lights is carried through the circuit breaker to terminal No. 7, from which a wire goes direct to the dome light switch, on models where dome light is used.

The operation of the lighting switch (right hand button) connects terminals No. 4, No. 7 and No. 6 together to give tail light, dash light and dim headlights, and connects terminals No. 4, No. 7 and No. 5 together to give tail light, dash light and bright headlights. The dimming is accomplished by means of a resistance mounted on the back of the switch between terminals No. 5 and No. 6.

The ignition button serves to connect terminals No. 1, No. 2 and No. 3 together, making these terminals alive from the battery through the ammeter. From terminal No. 3 current goes to the ignition coil and through the coil to the interrupter, and across the contacts to ground. At the same time it will be observed that another wire on the left end of the ignition coil carries battery current to the shunt field of the generator. Current from terminal No. 2 goes to the generator armature, so that with field and armature alive, the machine will run as a motor, using the generator windings, whenever the ignition is turned on.

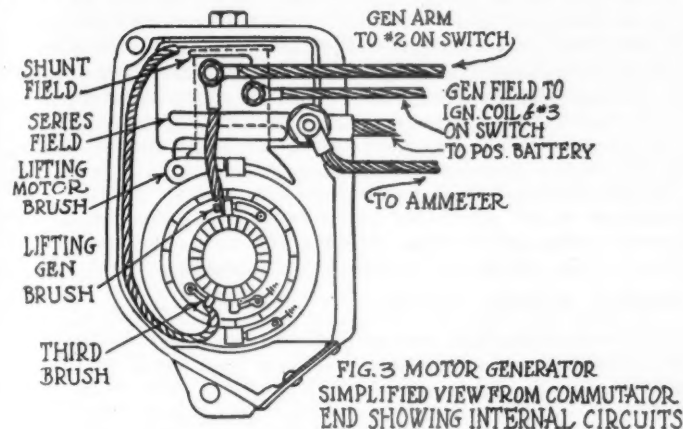
### Motoring the Generator

The operation of the ignition switch in supplying current



to the generator at the same time that the current goes to the ignition coil accomplishes two things. First, it eliminates the necessity for a cutout switch, which in most systems operates to connect the generator to the battery when the engine runs, and disconnects it when the engine stops. The same results are obtained manually when the ignition is turned on and off.

The second effect of the constructions used is to operate the generator slowly as a motor, which makes it easy to mesh the starter gears, as the small pinion on the armature shaft will, due to its rotation, easily mesh with the gear on



the starter clutch; as these intermediate gears are rotated, they will also easily mesh with the flywheel.

#### Starter and Generator Clutches

The operation of the starter pedal is accomplished with the foot and acts to shift the gears into mesh with the pinion on the armature shaft, and with the teeth on the flywheel. The last bit of motion also serves to lift the upper generator brush from the commutator and to drop the upper starter brush onto its commutator, completing the starter circuit, and cranking the engine.

When the engine begins to fire, it will usually run much faster than the starter has been cranking it, and, as the gear reduction between the motor and engine is rather large, the tendency of the engine speed is to spin the starting motor at such a high rate that the centrifugal force will injure the motor. Such a condition would occur if the driver did not instantly release the starter pedal when the engine starts, if it were not for the one way, or roller clutch, which is built into the larger of the two shifting gears shown in Fig. 5. This clutch is so designed that the motor can crank the engine, but when the engine tends to drive the motor, the clutch merely slips and prevents the possibility of any harm being done.

In Fig. 7 is shown the general nature of the construction of this clutch, and it will be observed that if the outer portion is turned to the left or counter-clockwise, the rollers will jam and drive the center part, but if the center part should turn faster than the outer portion, the rollers would roll to the right slightly, allowing the clutch to slip. The four push sleeves and springs which bear against the four rollers serve to hold them in contact with both the outer and inner portions of the clutch, so that they will always hold immediately when the action requires.

The generator clutch, which is built in the spiral gear that drives the distributor, is required for two reasons. First, it must slip, to allow the generator to operate as a motor, when meshing the starter gears, there being no rotation of the engine at this instant. Second, it must slip at a greater rate of speed, when the armature operates as a starter, for, due to the gear reduction, the engine is turning slowly compared with the armature rotation, so that the pump shaft is turning much slower than the armature shaft.

As the engine starts, however, and the starter pedal is released, so that the armature no longer spins under its own power, the clutch must operate to drive the armature and to generate current for recharging the battery. The general arrangement of the generator clutch is shown in Fig. 5, while the detail construction is shown in Fig. 6, the

action being similar to that described for the starter clutch, except that in some models notches are provided in the outer surface against which the rollers bear. As the rollers drop into these depressions, a clicking sound is heard, which acts as a warning signal to the driver in the event that the engine stops with the ignition switch left on. The signal is intended to call his attention to the fact that he has left the ignition switch on and that the battery will soon become discharged if the switch is not turned off.

#### Motor Generator Construction

With the commutator end bracket removed from the motor generator, the appearance is as shown in Fig. 2. It will be observed that there are two commutators, the smaller one being used for the generator action. At the bottom of the machine are two brushes, each bearing on one of the commutators, both being grounded, due to their installation on a metal plate that is attached at the bottom of the machine. This piece is shown as the "grounded brush plate" in the sketch, and can be easily removed for inspection, or replacing of the brushes.

Two other brushes are located at the top of the machine, one normally bearing on the generator commutator and the other normally held just above the starter commutator, its position above the commutator acting like an open switch, which prevents the flow of battery current through the starter. When the starter pedal is operated, the last bit of motion after the gears are in mesh serves to move the brush operating rod in such a way as to lift the generator brush from the commutator and drop the starter brush onto its commutator.

This action can be observed in the sketch, if we consider that the rod releases the roller, allowing spring action to push the upper part of the starter brush arm against the brush operating link, which in turn lifts the generator brush. Failure of the action to lift the generator brush from the commutator will result in slow cranking speed, due to the drag on the armature as the generator tries to charge the battery, when all available power is required in the starting operation. A third brush at the left of the lower main brush serves as a connection to one end of the field circuit, third brush regulation being used to prevent excessive charge to the battery.

#### Third Brush Adjustment

The maximum charge rate obtainable is regulated by the

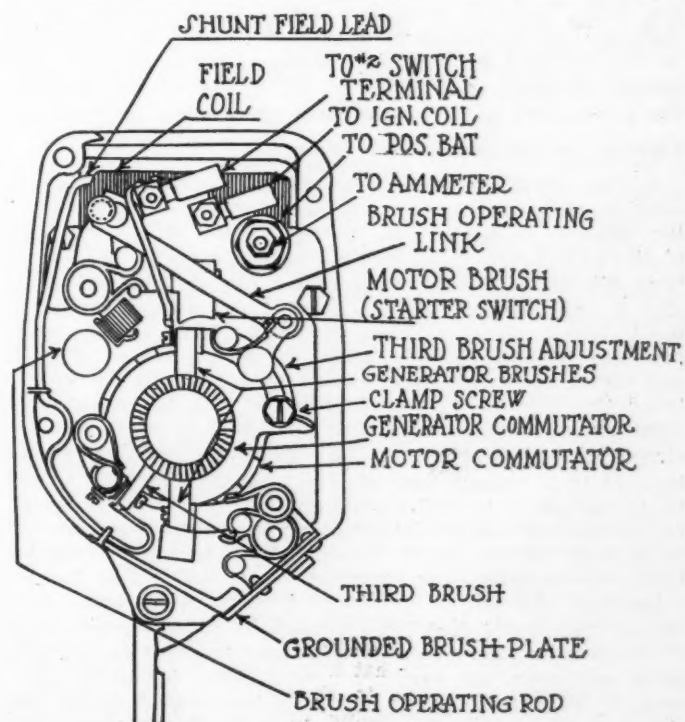
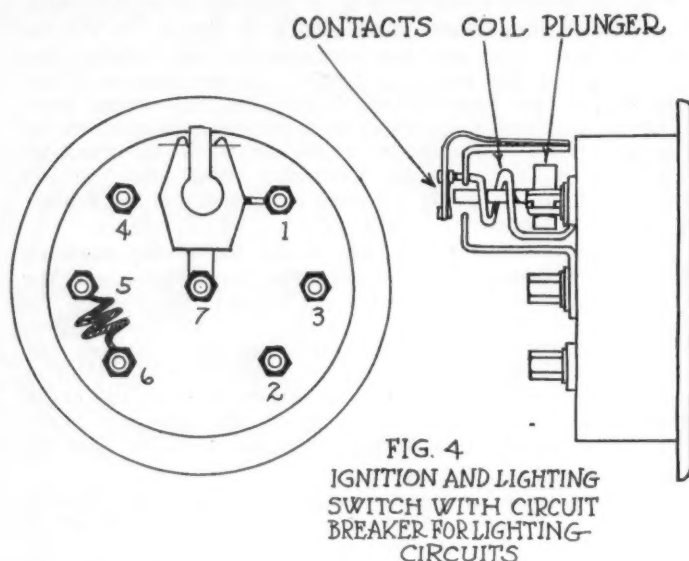


FIG. 2 MOTOR GENERATOR, END BRACKET REMOVED

position of the third brush, which can be shifted by loosening the clamp screw (Fig. 2) and pushing up or down on the projection of the "third brush adjustment," which shows in the sketch just below the clamp screw. Pushing down on this projection of the third brush adjustment will lower the output of the generator, while moving it up will raise the charging rate.

#### Motor Generator Circuits

A simplified view of the generator is shown in Fig. 3, from which some of the detail construction has been omitted, and



in which the various circuits are shown in such a way that they can be easily traced. This sketch can be compared with Fig. 2, so that both the mechanical action and electrical circuits can be traced.

It will be seen that the generator is a two-pole machine with one field coil, containing two windings, one a fine or shunt winding used in generating and the other a heavy winding used when operating as a starting motor. The upper two wires extending at the right go to the ignition switch, where they are both connected to the battery circuit when the switch is turned on. In order to test the generator by itself, when removed from the car, it is only necessary to connect these terminals together and run a lead from them to one terminal of a six-volt battery, connecting the other battery terminal to ground, or the frame of the machine. The series field is not in use when operating as a generator.

#### Lighting Switch and Circuit Breaker

In Fig. 4 is shown a side and rear view of the ignition and lighting switch with the automatic circuit breaker used in the lighting circuits. The general nature of the operation of the switch was explained in a previous paragraph headed "Car Wiring," a smaller view of the switch being shown in Fig. 1. In comparing Figs. 4 and 1, it must be borne in mind that the former shows the back of the switch, while the latter view is from the front, as though looking through and seeing the connections on the back. It will be remembered that the No. 1 terminal is alive with battery current from the ammeter, and in Fig. 4 it will be seen that the circuit then leads through the heavy coil of the circuit breaker to a contact, against which another contact is held by the action of an "L" shaped flat spring. This flat spring carries the current to the frame of the circuit breaker, and from there to the No. 7 terminal from which the various light circuits radiate, as previously described.

Inside of the coil of the circuit breaker is a plunger having a large head, which is attracted by the magnetic effect of the coil in such a way that it tends to separate the contacts and open the circuit to the lights. Normally, however, it is prevented from doing so by a small spring not shown in the sketch, the action of the lighting current being insufficient to overcome the action of the spring.

Should a short circuit occur in one of the lighting circuits, however, the magnetic effect of the coil will be in-

creased so that the plunger will be drawn to the left, knocking the contacts apart. This will kill the current and the plunger will return to its normal position. The circuit will thus be closed again, and the action will be repeated, producing a vibrating action which continues until the trouble is corrected or the switch turned off. The noise produced not only acts as a warning, but, due to the vibrating action, the value of the current is held to about 15 amp., so that there is no danger of the wires burning up, due to trouble in the lighting circuits.

#### Starting Motor Trouble

Slow cranking speed on motor generators of the type used on the Buick car may be due to the gear shift and brush operating mechanism failing to lift the generator brush from the commutator. This may occur when new generator brushes are installed, if the proper length brush is not employed; otherwise, an inspection of the brush shift rod and its action should readily reveal the trouble.

If the starter does not work at all, it may be that the generator is not operating as a motor, and that the gears are not going into mesh, so that the final motion of the pedal, which closes the circuit, is not obtained.

#### Generator Motoring Trouble

A six-volt test light is a convenient way to check the circuits, and with the ignition switch turned on, the light should indicate current when connected from the frame of the car to any of the generator terminals. If the large terminal is dead, it indicates an open in the connection from the battery, or corrosion at either battery terminal, or at the point where the battery is grounded to the frame of the car.

If the large terminal is alive and no current is available at the other terminals, it indicates an open circuit in the wires leading to or from the lighting and ignition switch or else in the switch itself or in the ammeter. The various terminals should then be tested in the following order:

The right-hand ammeter terminal.

Left-hand ammeter terminal,

No. 1 terminal on switch

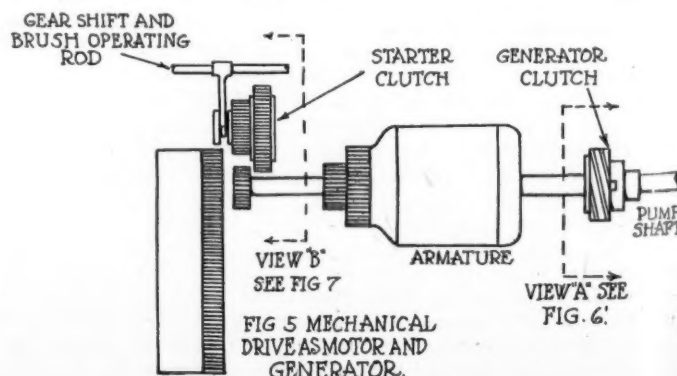
No. 2 and No. 3 terminals on switch.

Finally, the upper two terminals on the generator.

If current indications are obtained at one of the preceding tests and not at the following test, it indicates an open circuit between the two points. For example, if the test lamp lights when connected from ground or the frame of the car to the No. 1 switch terminal, but fails to light up on the No. 3 terminal, it shows an open circuit in the switch, which would not only kill the ignition circuit, but prevent motoring of the generator as well.

If the test lamp lights when connected to the frame of the car and to either of the generator terminals, it would be well to disconnect the leads from the two upper terminals and flash them to the terminals from which they were removed. Failure to get a flash would indicate an open circuit inside of the machine itself, which would have to be repaired after the motor generator was removed. If the machine motors as a generator, the meshing of the gears can easily be accomplished, and failure to crank the engine can then be checked, as follows:

The lights and ignition should be turned on, and the action of the lights carefully observed as the starter pedal is





pressed. No change in the brightness indicates an open circuit inside the motor, possibly due to the upper brush being worn so that as it is dropped it does not quite come into contact with the commutator. With the lights operating, the trouble can not be in either the battery or connections to the starter, as trouble here would affect the lights.

If the lights go out when the starter pedal is pressed, it usually indicates a corroded battery terminal or poor connection where the battery is grounded to the frame. This can be detected by operating the starter pedal and holding it down for about a quarter of a minute, and then quickly feeling the terminals and ground, as a poor connection, if capable of carrying any current at all, will rapidly heat up. A surer way is to use a voltmeter across the suspected poor connection, taking a reading while the pedal is held down. A bare movement of the needle would indicate normal conditions, but if a large deflection is obtained, it indicates a poor connection, or corroded terminal.

If the lights dim considerably but do not go all the way out, the individual cells of the battery should be checked, as one may be found to be shorted, giving either no reading or a reversed reading. If all are low, the gravity of the electrolyte should be checked with a hydrometer, as a recharge to the battery may be all that is needed. If the battery seems to be O. K., the excessive dimming may be due to a very heavy draw of current such as would be produced by a grounded field coil, and this can be checked by putting a high reading ammeter (350 to 500 amp. scale) in the circuit and checking the current. Normal cranking current will usually be from 125 to 175 amp., so that if the current is away in excess of these values, the ground is the most likely possibility. This, of course, requires removal of the unit before the trouble can be corrected.

#### Generator Trouble

The tests previously given under the head of "Generator Motoring Trouble" will also explain the failure of the generator to show charge to the battery and, if both of the upper terminals are alive and both flash when their wires are removed, it indicates internal trouble, which is most likely to be in a grounded or open or shorted armature.

#### Generator Field Current

Failure of the generator to show a charge to the battery may be due to trouble in the shunt field, and this can be checked when the generator is either on or off the car, as the correct field draw is from 1.25 to 1.5 amp., and an excessive current would show either a ground or a short in the winding. Grounds can usually be repaired by using insulating paper between the coil and the pole or frame, but if the coil is shorted, a new one may be required.

#### Ignition Trouble

The tests referred to under the heading of "Generator Motoring Trouble" will also check the ignition circuits to

the extent of insuring a connection to the end of the ignition coil on which the ballast is located. This can, however, be tested with the test lamp to see that the ballast is alive from the battery.

To check the primary circuit, it would be well to insert a test ammeter in between the coil and the interrupter, so that ignition current only will go through this ammeter. This is necessary, as the ammeter on the car shows not only the ignition current but also the current used by the generator when motoring. With the ignition switch turned on and the engine turned slowly either by hand or with the

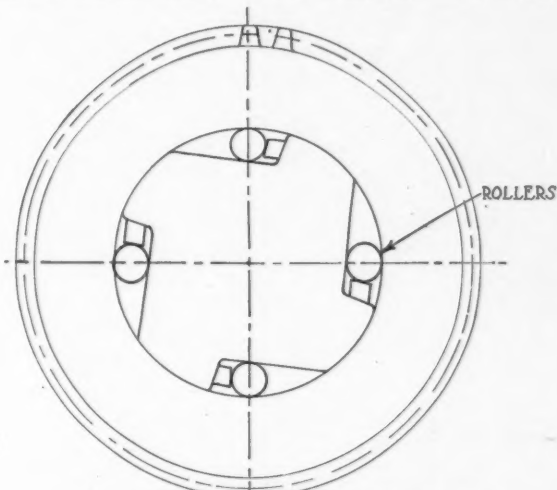


FIG. 7. STARTER CLUTCH BUILT IN INTERMEDIATE GEAR (SEE VIEW B IN FIG. 5)

starter, the test ammeter should show about five amp. when the interrupter points make contact, and should show nothing when they separate.

If the interrupter points are held in the open position, and a slight deflection is noted on the ammeter, it indicates a shorted condenser, which will have to be replaced with a new one before sparks can be obtained at the plugs. A more sensitive test for a shorted condenser is to use a voltmeter instead of an ammeter, as the leakage through the ammeter is sometimes too slight to show, unless the ammeter is a very low reading instrument.

With the interrupter making and breaking the primary current and the condenser O. K., the only other chance for trouble that would prevent getting any sparks is that the coil itself is shorted. There is no test for this except that a good one will work and a shorted coil will not.

#### Timing Adjustment

The timing adjustment is at the base of the distributor shaft, where it extends downward and is driven from the generator shaft by a pair of spiral gears. To get at this adjustment, it is first necessary to remove a plug directly under the shaft. This exposes a hex head screw which, when removed, loosens the distributor shaft so that it can be turned to any desired position. With the No. 1 cylinder on firing dead center, the shaft can now be turned until the interrupter points are just about to separate, with the distributor arm under the segment that connects to the No. 1 cylinder. The hex head locking screw should now be tightened, the timing checked again and the plug replaced.

The next article will explain the Auto-Lite System on 1921 Overland cars.

Regarding anti-freeze, the use of wood or denatured alcohol seems to meet with the approval of the majority. In using them there is no danger whatsoever to the engine or radiator and, if the solution is frequently tested with a hydrometer, the exact nature can be determined and the resultant freezing point of the solution. A chart printed in the Nov. 3 issue shows these temperatures, together with the per cent by volume of the solution and the specific gravity. Glycerine is often used with alcohol, as it helps retard the evaporation of the latter. Glycerine, however, is expensive.

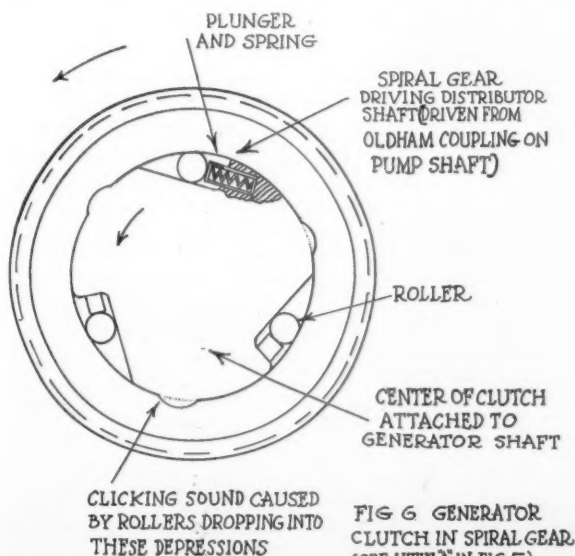


FIG. 6 GENERATOR CLUTCH IN SPIRAL GEAR (SEE VIEW A IN FIG. 5)

# Mr. Dealer *takes his* Pen in Hand

## Parts for the Repairman

I HAVE noticed several articles in MOTOR AGE as to "pirate" parts.

Here are my experiences with factory branches:

I do not have a car agency, as I do repair work only, and therefore get no discounts on parts. Upon writing to factory branches for parts, I am referred back to my local competitors. I am then obliged to wait for these parts anywhere from two weeks to two months, as no one here carries many parts and local dealers order them from the factory.

No one can expect trade under these circumstances.

Another instance: I went to the branch house in person, and placed my order for overhead rocker pins at a cost of 35 cents. A few months later I personally ordered more pins and the charges were 70 cents plus 5 per cent tax and 15 per cent "average handling and overhead."

Upon calling their attention to my previous lot, they looked upon me as a mad man, fit for an asylum, denying all knowledge of such prices.

My order that day included some bulky articles and I requested them to wrap them up. They asked me if I was a dealer and, upon telling them I was not, they refused to let me have any parts, saying they had trouble enough supplying their own dealers, so I came away without them.

Also, when I write for parts catalogs, some manufacturers fill my request and others tell me they can't let me have them under any circumstances.

If this is fair and square—bring on your "pirates;" I won't turn them down.

—A. D. Stuehm, Peotone, Ill.

## Opinions on Used Car Problem Wanted

EDITOR, MOTOR AGE: What is your opinion of the following proposed solution to the used car problem for our city and immediate vicinity:

1—Established dealers who handle well-known makes of cars to inaugurate a monthly auction to be held in as prominent a place as possible in the city.

2—To hire a competent auctioneer on a two per cent commission basis with a minimum guarantee to conduct the auctions.

3—The dealers to advertise the auction thoroughly.

4—To permit anyone to list anything for auction.

5—The charge to the owner for auctioning his property to be four per cent.

6—To attempt to make the two per

cent profits on the sales meet the expense of the auction.

7—When a vehicle is listed it must be sold, though the party who lists the article may bid it in himself by paying the commission fee of four per cent.

8—The dealers to pledge support to the auction by refusing to take in used cars on new sales.

9—Dealers will have privilege of bidding for vehicles auctioned.

I have never been connected with an auction, and I may have erroneous ideas; but it appears to me that the following developments might be expected:

1—It would make everyone hesitate in purchasing a new car with the idea of selling it at a profit, in direct competition with the auction.

2—It would stimulate the movement of used cars without their having to be handled by dealers.

3—It would lower the conception of owners as to what an old car is really worth.

## An Executive of a Small Service Department Expresses Views on the Flat Rate Plan

I HAVE read with interest the articles of several Service Managers, treating on "The Servicing of the Automobile," but find that most are connected with large institutions, having a large force of employees, ranging from janitor to the president.

I would like to give you my views of a small town, up-to-date service station, managed by a person who has been thoroughly through the mill, from greasehound to general foreman, being at present, owner, manager, general mechanic and, sometimes, greasehound.

I built up a business from a total outlay of \$250 in a rental building, measuring from 26 by 30, to my own building costing \$7500 measuring 48 by 75, with room for addition. This was accomplished in a town of 900 inhabitants, one competitor, and in four years' time.

I have always been a great booster for service, giving it in the fullest measure, appeasing a dissatisfied, though reasonable customer at no matter what cost. If I lost money in the transaction, it would be charged against advertising; but advertising has paid me well, in that it taught people, who later became my customers, that I was on the square, and by adhering to this principle I built a profitable business in this locality.

About the flat rate. As quoted by a service manager in a recent issue of

4—If there is an ability to absorb used cars, the dealers could make more clean sales.

5—It would eliminate the customers' getting the dealers to bid against each other on the allowance on used cars in order to make sales.

6—It might tend to eliminate the curbstone broker in cars.

7—It would free the dealers from the troubles connected with the used car sales.

The cars could be sold in "as is" condition, or, if found advisable, the owners of the cars listed for sale could demonstrate to interested parties for one hour before the sale.

I have broached this matter with one or two dealers and they feel kindly toward it, but before going further, I would like to get the point of view of others, for there may be factors connected with the matter that have not come to my attention. Louis F. Boyle, Pyramid Investment Co., Laramie, Wyo.

MOTOR AGE, it does not seem to me that they are fair to all customers. Every mechanic knows that it is easier to work on a car that receives proper attention and lubrication than one that is abused and neglected. Still the advocates of the flat rate system think that there should be no distinction.

As one manager states, "What the owner pays for is the ability of the service station to perform a given operation at one certain price. This, however, requires machinery, tools, etc." Now let me ask what kind of a tool or special piece of machinery (and where to obtain it) would be required to remove a rear spring bolt from the Overland 85-4, this being rusted fast; or the transmission from a Nash, a splined end of the clutch being badly worn or rusted; or the front pinion shaft bearing of a Dodge after it has been battered and wedged, by being run after bearing has broken?

To be fair to yourself and customer, the same price cannot be charged for a given operation regardless of conditions; either the firm is losing money or the rate under which it operates is entirely too high.

A high rate would, to my estimation, be necessary in order to keep a shop clear, as many of the present automobiles are running in a very neglected state of repair.—D. A. Muller, Modern Garage, Highland, Kas.



# Service Business Has Been Mainstay of Iowa Dealer This Year

*State Meeting at Sioux City Attracts 200 Stalwarts Who Spend Two Days in a Very Profitable Discussion of Getting Business in the Future*

By DAVID BEECROFT

**T**WO hundred members of the Iowa Motor Trades Bureau, the state organization of motor dealers, held one of the most successful conventions of its history at Sioux City, Thursday and Friday, notwithstanding the fact the attendance was smaller than at past conventions, 200 being a relatively small attendance out of a membership of 1,400.

Two hundred was also a small attendance out of a total of 4,400 dealers in Iowa. The reason lies in the fact that 1921 has not been a very promising Iowa year. The state being pretty nearly 98 per cent agricultural, received the worst solar plexus of its career a year ago and the legs of many industries and particularly agriculture, are still wobbly. But the 200 dealers who attended the convention were pretty largely the backbone and sinew of the dealers and represented many who have been in the business 20 years and are prepared to carry on in spite of depression.

It was a two-day convention. One of the best features of it was the opening afternoon when the delegates divided into four groups and held four sessions at the same time. These sessions were round table discussions, with no prepared speeches, but in which the chairman called on anyone to speak to the subject. The four groups into which the delegates divided were:

Group 1—Automobile and Truck Sales.

Group 2—Garage and Service.

Group 3—Batteries and Ignition.

Group 4—Tires and Vulcanizing.

The first two groups took the attention of all the dealers and the last two went by the boards.

How to stimulate car sales brought out many ideas, particularly when Iowa dealers have to go after business as compared with when it used to come to them. Some dealers are dividing all prospects into groups according to industries, such as railroads, doctors, merchants, bankers, farmers, manufacturers, etc., and putting special men in each group; and in smaller cities where the owner is the salesman, he is going to in a few cases concentrate on special groups.

## Majority of Sales to City Dwellers

During the year 1921 car sales to farmers in Iowa have been practically nil, excepting in some dairy sections and in other instances to those few farmers who kept out of land speculation, did not buy blue sky stocks, did not go touring in harvest months to California, and who paid off mortgages and bought Liberty bonds.

The town and city sales have kept many dealers going, but in the last 60 days, in cities like Des Moines, there has been a very perceptible dropping off in city sales, as a result of the buyers' strike among the farmers having reached the pocket-books of the town or city doctor, lawyer, merchant, etc., who are not collecting what is due them from the farmer. In the last few months railroad centers, which all year have been good buyers, have dropped off very suddenly, no doubt due to the many rumors of reductions in railroad wages. Present strikes in meat packing centers have added an extra drop in recent business.

Notwithstanding the fact that Iowa states will scarcely

equal 50 per cent of a year ago and, in many sections, not ten per cent of a year ago, there is a feeling that a turn upwards is at hand. The accessory business across the state this year has not been 50 per cent of a year ago; it has more conservatively approached 40 per cent, but the "Ask Them to Buy" campaign is under way and in some of the bigger centers, accessory sales of \$800 a week were reported on the floor of the convention. There was not a case reported where the plan has been tried that it did not work out successfully.

As a result of seeing the film prepared by the Automotive Equipment Association which was presented by L. A. Safford, vice-president McQuay-Norris Mfg. Co., the dealers are going back to organize to "Ask Them to Buy—and Pay," and there is no doubt of the success that will follow.

D. E. Darrah, sales promotion manager of the Hart-Parr Co., tractor manufacturer, gave an excellent picture of what it means to be a tractor dealer. Today 25 per cent of Hart-Parr tractor dealers in Iowa are automotive dealers. The best tractor dealers are those who departmentalize by creating a tractor department and placing a manager in charge of it, or the farm power equipment dealer who organizes to sell tractors and farm equipment exclusively. The old time implement dealer according to Darrah has ceased to function so far as selling tractors is concerned.

## Repair and Garage Business Good

The Iowa dealer and garageman, who handles repair business and sells accessories has been doing a healthy trade all year, particularly in the repair business. Many of the garagemen in towns of 2,000 population have given up the sale of motor cars during the year, but they are continuing their repair and garage business. There are towns of 2,000 population where there used to be six or eight garagemen selling motor cars, but as many as four, and in some instances five, have given up the sale of cars and are confining their efforts to repairs and selling accessories as well as a general garage business. Many of them declare they are not going to take up the sale of cars again, although it is expected that when conditions improve some of them will change their minds.

The development of repair business has increased greatly in the last year at the expense of the country blacksmith. One dealer, in a town of 1,500, has the service for two makes of tractors, although he does not sell tractors himself. He has a good line of repair business for farm equipment, such as stationary gas engines, threshing machines and general farm lines. This has been good business for this year and will continue to increase. This dealer has approximately \$2,000 worth of machine equipment and it is proving his best money-maker at the present time.

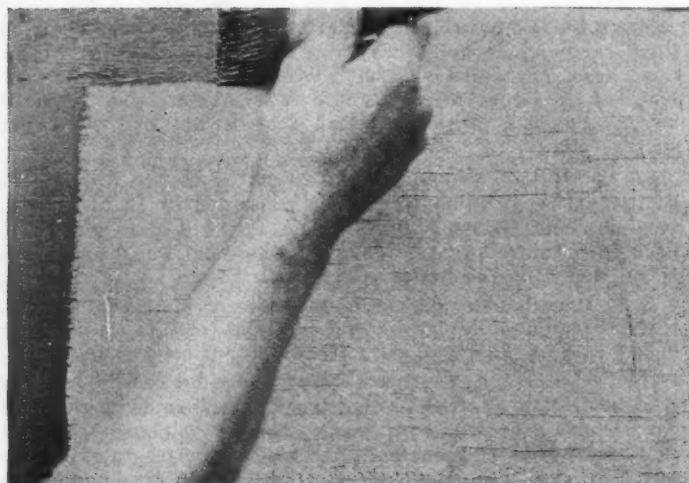
All garagemen well equipped to do welding are well satisfied with the results they are receiving. It has been a good investment. Some of them make a specialty of this work and are equipped with trouble wagons so that they pick up some of the biggest welding jobs through the country and bring them to their garage. The garageman has learned in the past year how desirable it is not to have all of his eggs in one basket, so that when car sales stop he has a line of business that is going along and caring for rent and living expenses.

## Why Not a Paint Shop?

# First Steps in Automobile Painting

*Improvements in Methods and Material Have Made It Possible to Do a First-Class Job in Two Weeks—Modern Practise Produces Excellent Results At Great Saving of Time*

By G. KING FRANKLIN



Applying a coat of rough stuff—squaring off

ON the highways of Motordom one often hears the remark that the old-time carriage painter is extinct and that the present day auto painter is but a poor imitation of his predecessor. Now there is a grain of truth in this, but the statement is mostly fiction. The truth in it arises from the difference in working conditions, while the fiction is found in the belief, if it exists, that fine finishes of former days cannot be duplicated today.

The master-painter who decorated the equipages of the past mixed his own primers and surfacers, ground his own colors, and in some instances made his own varnishes. Raw linseed oil was put in most of his first coats, and, as a result, many days had to be allowed for drying. Six or eight months might be taken in turning out a first-class job, and as many as 24 coats of material employed.

Today, thanks to improvements in methods and materials, a first-class job can be turned out in two weeks and ten coats is considered ample. No longer is the painter compelled to mix his own materials or grind his own colors. This is now done for him in a superior way by manufacturers who make a study of his needs and produce a complete assortment of everything required in his work.

Thus we see that conditions have changed so far as materials and methods are concerned, and naturally the individual has changed with them, but who will say that the fine work of today is not the equal of that turned out in olden days? Conditions have also changed regarding the quality and quantity of work demanded of the ordinary shop, and this, too, has had its effect.

The modern expert automobile painter is the result of the survival of the fittest, and no workman of the old school could successfully conduct a shop in competition with him if he turned out work according to the old standards.

Of course, there are certain operations in the work that are

still the same today—the improvements that have taken place lying particularly in the materials and the way they are handled to produce different results. So it may be said that the old-time carriage painter is the nearest approach of any allied trade to that of the modern school of automobile painting, as it is here simply a matter of bringing old standards up to date. House painting, however, is a trade much further removed, as there is a big difference in both the materials and operations employed.

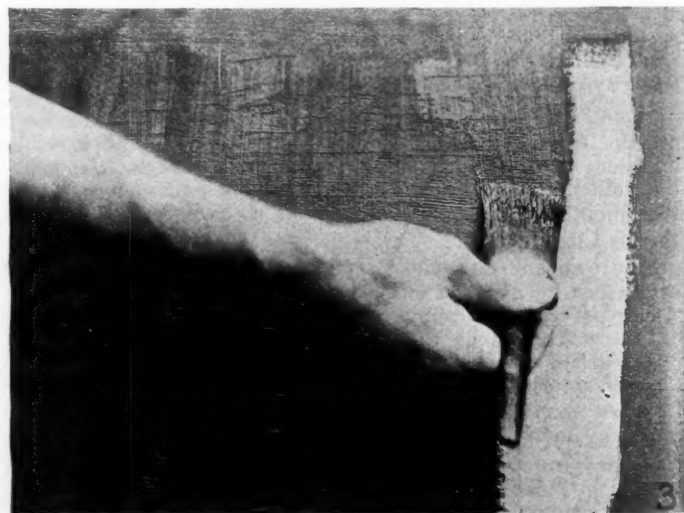
Old-time carriage painters and house painters, as well as others, who wish to learn the modern methods of automobile painting, will do well to get in touch with the Chicago College of Auto Painting, which teaches by correspondence the use of modern materials and methods.

### Competent Men Needed

All of the foregoing has been said with the idea of clarifying the minds of some garage owners who have it in mind to add a paint department to their service by employing some local house painter or a coach painter of the old school. The latter will no doubt be able to turn out the work, but not at a price to meet strong competition.

A workman should be employed who has a knowledge of modern methods and materials; is able to work on wood, metal or wall-board, all of which are used in body manufacture; and employs a combination of operations that will produce the right job for the money in the shortest possible time—no old-fashioned slow drying materials, and the fewest coats possible to produce the desired results.

It is not intended to convey the idea that the two tradesmen mentioned above are the only individuals competent to qualify for this sort of work. On the contrary, it is a field that is



Filling in



open to any ambitious individual who can read the handwriting on the wall and see the future. The country is just beginning to get itself organized to give service on the paint and varnish needs of the car owners. Right now the problem is to get competent men who can handle the work, and none but expert automobile painters will do.

Only the other day a house painter wrote in and said that the mirror-like finishes on an automobile were a mystery to him, and every car that he attempted to paint had the appearance of having been dusted with sand by the time that he got through with it. He asked what his trouble was and we told him "everything." He did his work with the so-called motor car enamels and looked for the fine results that the manufacturer's advertising had led him to believe he could get. The ad had said "wash off all dirt and grease, apply a coat of XXYZZ enamel, and in the morning you will have a new car." To show you how fruitless would be the attempt to obtain a fine finish by simply washing a car and applying a coat of enamel, let us take you through the different stages that the automobile painter uses to produce it.

Suppose we start with a wood panel that is to be sanded to clean and prepare it for the primer. This primer is a material whose viscosity is such that it will enter the pores of the wood and seal them against moisture and decay, and at the same time dry with a film possessing sufficient elasticity to act as a foundation for the paint coats that follow.

#### Different Rates of Expansion

Wood and paint have different rates of contraction and expansion, so you can see that during sudden changes of temperature the primer must compensate for this difference, or otherwise they would separate and the paint chip and flake off.

After this priming coat has been applied and allowed to dry, special thick bodied materials are applied to fill up any low spots in the surface and make it possible to obtain a uniform surface with the rubbing or sanding that follows. The materials used in this filling operation are known as fillers and surfacers and include roughstuff, sanding surfacer, glazing compounds and putty.

The roughstuff and sanding surfacer are thinned down with turpentine and applied with a brush, while glazing compound or putty is wiped over the surface with a putty knife. Roughstuff is a heavier bodied material than sanding surfacer and dries with a tough film that must be ground down with a rubbing stone and water, while the film of sanding surfacer is more brittle and can be sandpapered.

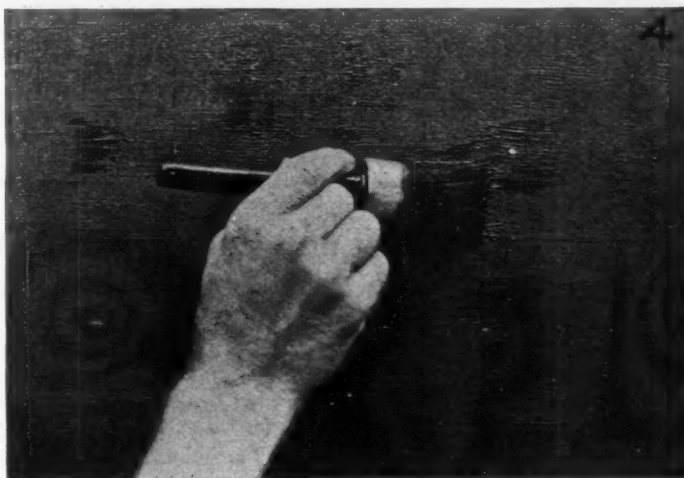
Glazing compounds are also suited for sanding. Roughstuff is the best filler of all and produces the best surface, but it requires longer drying periods than the others and must be rubbed down with a rubbing stone and water, so where speed is desired the other materials are most generally used. But for the best grades of work roughstuff is preferred.

The rubbing that follows its application, or sanding that follows the application of the others, is the means whereby

it is freed of brush marks or other defects and brought to a uniform level. Defects left in the foundation coat will perpetuate themselves through the decorative top coats, and it is for this reason that they are removed by rubbing or sanding them out.

It may be likened to a mirror whose defects or irregularities distort the object reflected, because after the lustrous coat of finishing varnish has been applied, the panel itself will become a sort of mirror and the minutest defects, such as brush marks, low spots, specks, etc., will become greatly magnified—hence the necessity for good surfacing in the best grades of work.

In Figs. 2, 3 and 4, a coat of roughstuff is being applied. First the panel is squared-off; in Fig. 2 it is being filled in; and in Fig. 3 it is being laid off into a uniform film. These three operations show how material is applied to a surface in order to obtain a uniform film free of runs and laps. After this coat is applied it is allowed to dry, and then any necessary puttying done and the next coat applied. In all, four or five coats may be applied in order to build up a suffi-



Laying off coat of rough stuff in a uniform film

cient thickness of material so that high and low spots can be brought to a uniform level by the rubbing. The rougher the surface the more coats of filler required.

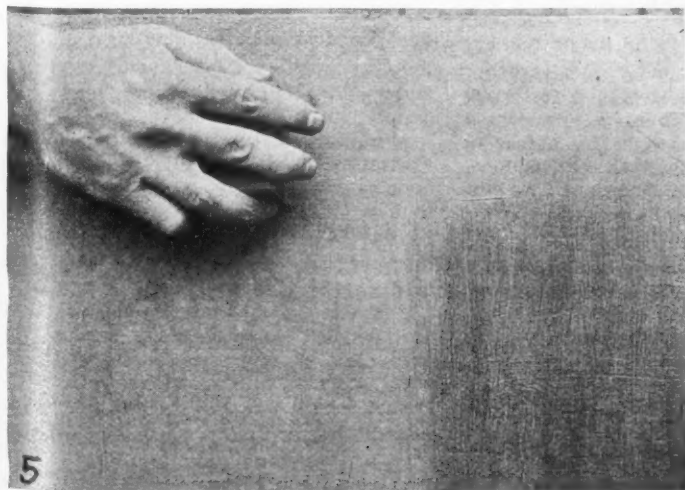
Fig. 5 shows the same panel after four coats of roughstuff have been applied and one-half of it rubbed down with a rubbing stone and water. The rubbed side is smooth and level, and offers a dense hard surface for the decorative work that follows. The unrubbed side is rough and defective, and its condition will become more noticeable as the succeeding coats are applied.

With the filling and surfacing work completed, the panel is ready for the decorative color coats. In beginning this work, flat color coats are first applied to serve as a background for the decorative color-varnish coats that follow them, as the latter are not opaque materials. Flat color is the paste japan-color thinned down with turpentine to a brushing consistency.

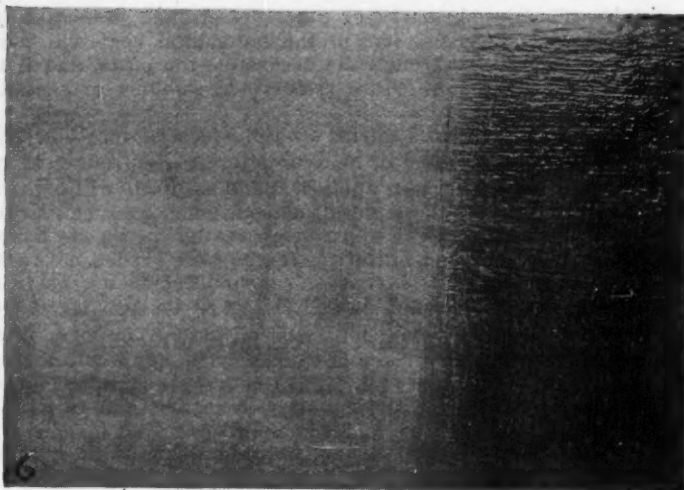
It dries with a dull, glossless appearance—hence its name. These coats are also known as ground-color coats. After they have been applied, the surface is ready for the real decorative color that is mixed with rubbing varnish and known as color-varnish. From one to three coats are usually applied, depending on the covering power of the color or the style of job, and each coat must be surfaced with an abrasive in order to free it of specks, brush-marks or other defects, just as the preliminary coats were ground down to free them of defects and obtain a uniform surface.

Only now a differently textured surface is offered—varnish—and this requires a finer abrasive, as the rubbing stone would scratch it. So here powdered pumice stone is used on a piece of felt with water, and after the color-varnish film is dry, it is rubbed to free it of defects and kill its gloss.

After the color varnish coats have been applied and rubbed the surface is ready for the final decorative and protective coat—the finishing varnish. This coat of varnish gives the surface its brilliance and luster and serves to protect it from the weather. The color-varnish coats if left exposed would soon



After four coats of rough stuff have been applied and rubbed down with a rubbing stone and water



The coats on the left side of this panel have been rubbed. Those on right have not, showing necessity of rubbing

go to pieces without the protection offered by the finishing varnish.

In all of the foregoing, you have seen how a smooth foundation was obtained by rubbing down the filler coats, and how

this rubbing was continued on each one of the color-varnish coats. Just how important this has been can be seen in Fig. 6. Here one side of the panel has been brought through two coats of color-varnish without rubbing either the filler or color-varnish coats, while the other side has been properly surfaced, as heretofore mentioned.

Now we have outlined about eight different things that have to be done to obtain a mirror-like finish on this wood panel, so you can readily see why such finishes cannot be obtained by simply washing a surface and applying a coat of the so-called enamel as the house painter tried it. Of course, the car that he worked on was an old one, where, condition of coats permitting, some of these operations could be dispensed with; but the theory of the work remains the same, and even in repainting over old paint coats, it is essential that the proper foundation be had before attempting to decorate it.

#### Educating the Workman

The erection of a series of paint coats on a surface is an engineering problem that starts with the foundation and continues on up through the superstructure, each coat a problem in itself. And what would you think of a builder who gave no thought to foundation, but started building a roof.

An apt conclusion that can be drawn from all of this is—don't bring the standards of your paint department down to the level of just any workman that SAYS he knows it all, but rather bring the standard of workman up to the level of the department.

## Oil and Fuel Economy to Be Advanced by French Touring Car Grand Prix Contest

PARIS, Nov. 25—The first three entries for the French Grand Prix 122 cu. in. race have been received from the Rolland-Pilain Co. The drivers have not been nominated, but it is known that one of these will be Albert Guyot, who is acting as captain of this organization. The date and place of the French race have not been decided. Le Mans, Marseilles and Strasbourg are among the candidates for this event, which probably will be held at the end of June or early July.

On the day following the 122 cu. in. Grand Prix, the French Club will hold a Touring Car Grand Prix race, for which three Voisin cars have just been entered. The basis of this event will be an allowance of gasoline at the rate of

17 liters per 100 kilometers, equivalent to 13.78 miles per American gallon.

This allowance of fuel will comprise all the oil and grease required for the race and, in consequence, competing cars must be presented with base chambers, gear boxes and rear axles drained dry. After these have been filled with the quantity and kind of oil and grease required of the competitors, the remainder will be supplied in the form of commercial gasoline of 710 to 740 density. This system has been adopted in order to prevent the excessive oil consumptions which have marked some fuel consumption tests in France where gasoline only was limited. In these trials competitors aspired oil from the base chamber and thereby effected wonderful economy in gas consumption.

Four-passenger bodies must be used in this race, the minimum width of the body being 45 in., with fenders of not less than 8¾ in. width. The gasoline tank must be placed behind the driver's seat, in a clearly visible position, and a folding top, which can be lowered during the race, must cover the four seats.

Electric or mechanical starting is required. An exhaust muffler must be employed during the race and spare wheels or tires cannot be carried inside the body. Only the driver will be allowed aboard during the race, but ballast equivalent to three passengers at the rate of 154 lbs. per passenger, must be carried. The minimum weight of the cars empty is fixed at 3086 lbs.

## French Will Try to Motor Across Sahara Desert at Its Greatest Length

PARIS, Nov. 28—An attempt to cross the Sahara desert in its greatest length, by automobile, will be made during the month of December. The start will be made from Biskra, in southern Algeria, and the destination fixed will be the Niger. For this demonstration a 10 hp. Citroen fitted with the Kegresse system of rubber creeper bands will be made use of, the car being driven by Engineer Kegresse and having as passengers two French military officers.

This system of propulsion was invented by the French engineer Kegresse when acting as chief of the imperial automobile service in Russia, and was intended especially for travel over snow. It was found that rubber creeper bands gave excellent results over snow, and demonstrations made in France last winter showed that the Alps could be crossed without difficulty.

An attempt is now being made to adapt the same principle of rubber creeper bands to automobiles designed for work over all kinds of country unprovided with roads, and it is with this object in view that the trip across the Sahara desert is being undertaken. The inventor claims that even for transportation over roads where speed is of minor importance the rubber creeper band system can compete with rubber-shod wheels.

A second competition for automobiles capable of traveling over snow will be held during the present winter by the Automobile Club of France in the neighborhood of Mont Blanc. The first trials of this nature were held a year ago, when two types of machines were presented, and the Kegresse system of rubber creeper bands proved its value. The object of this competition is to encour-

age the development of a type of automobile capable of passenger service in snowbound regions.

A number of the motor car dealers in Fort Wayne, Ind., recently combined in a cooperative page in which each dealer took a small space on the page and in which the central space was used for the purpose of running copy boosting used cars.

The page was headed: "A Spotlight on the Used Car Situation." In this copy a number of interesting statements regarding used car conditions were made, among which was the following: "It is a striking fact that you can buy dependable used automobiles for less money than you could before July 1. It is also a dependable theory that you can buy these cars at less money now than the same cars can be sold during the coming season of 1922."



## By Making Three Weeks Preparation

# Sold 42 Used Cars in Three Days

*Every Car Thoroughly Overhauled and Tested  
Salesmen Drove Each Car Until Satisfied It Was a Good  
"Buy"  
Talking Points Drilled Into Each Salesman and He Knew  
the Past History of Each Car  
Enthusiasm Continually Revived During the Sale*

THE Packard Cleveland Motor Co. has again demonstrated the age-old theory that elbow grease, plus a liberal mixture of leg work and use of brains, composes a formula that cannot be beaten for selling cars.

The agency has just had it forcibly demonstrated that in these times—the season between “hay and grass”—the above combination will sell used cars and new cars, for that matter, in proportion to the hard work applied to the task at hand.

In three strenuous, busy days that were crammed with concentrated effort on the part of everyone in the entire Packard agency organization in this city, 42 used cars were sold for a sum that was a big addition to the agency bank account and caused every motor car dealer in the city to talk about the wonderful accomplishment.

There was nothing spectacular about the methods used to sell these cars. There were no fireworks exploded to attract the attention of the city. No parades were held. No special premiums were offered. No inducements as to time payments were made. The first down payment was not less than the usual amount required by the agency in its regular course of business. No system of causing salesmen to hotfoot it about the city for prospects was engaged in. No circular letters setting forth in glowing terms the advantages of the sale were mailed out.

But this three day sale of the agency certainly was not a funereal or drab affair.

For three weeks the entire agency organization did nothing but prepare for that three days' sale. Of course, they handled prospects for new car sales; but the point is, that they subordinated every other detail of their business to preparing for the used car sale.

Their service department and the mechanics therein first got on the job. Every used car in the agency was thoroughly overhauled. Tests were made after the mechanics reported the jobs were O. K. This took nearly three weeks. Salesmen got in the cars and drove them around until they were satisfied there were no flaws.

While the service men were busy ironing out kinks in the mechanism, salesmen were gradually being keyed up to the point where their enthusiasm would boil on the first day that the sale started. Coaches of big college football teams train their teams for weeks to a certain game, and when the eleven lines up for the kickoff the players and team are at the height of physical development and team play.

### SALES ORGANIZATION TRAINED LIKE A FOOTBALL TEAM

The team of Packard salesmen were trained for three weeks to this three day special sale. Each man had his place on the floor assigned to him. He had talking points drilled into him. Every salesman knew how to operate each car on the floor. He knew the strong points of each used car that went on sale. When possible, he knew the name of the original purchaser of each car; that person's occupation and his habit of driving. These he used in his selling talk.

There were organization meetings almost daily throughout the three weeks. Salesmen brought up points to be discussed. All of this tended not only to instruct each man, but to arouse

his enthusiasm and to make him believe that he was going to put over his part of the task assigned to him.

The next thing that was done after all the cars were repaired and the salesmen were about ready to do their part, was the marking down 10 per cent of the inventory; that is, if the total value of the used cars to go on the market was \$100,000, the agency put the figure down to \$90,000.

The only method that was used to attract the attention of the public to the sale, after everything was ready for the three-day drive, was daily newspaper advertising. The company put the advertising campaign over big. The theory was that since the three-day special sale was to be one of the biggest events of the year, the advertising should be carried on in a proportionate scale. Half page ads were carried not only in the single morning paper in Cleveland, but in both the afternoon publications.

Everyone in the city who read the newspapers could not miss that striking advertisement of the Packard agency. It stood out like a beacon light to a lost mariner. It paid, too.

More than 700 persons visited the salesroom on the first day of the sale. A great many asked for demonstrations of cars. Everything went like clockwork on these trips. Every battery was perfect. No trouble was experienced in any of the demonstration trips, and no salesman had to start with such a handicap.

While the salesmen were on the floor, they were under the constant supervision of an experienced man. Every man who lagged a little had his attention called to the fact. He was advised to “pep” up and his weakness was pointed out.

### SPECIAL CREDIT PREPARATIONS ASSIST IN CLOSING SALES

On the day prior to the opening of the sale of used cars, all the new cars were taken from the salesroom—the main one. Since this used car sale was to be the big feature of the agency, the new cars were subordinated, temporarily, again. The agency has a regular used car display room, but it is not as well appointed as the new car room. The used cars were brought over to the new car salesroom and the latter were taken out of sight.

There were two credit men at hand all the time and two cashiers were on the job, so that there was no delay in looking up the financial responsibility of the purchaser. The agency was able to close the credit arrangements on the spot with every purchaser, who was made to feel that his word was considered as good as his bond. But every name handed in to the credit men, unbeknown to the purchaser, was carefully scrutinized.

The down payments, for most of the cars were sold on time, averaged 40 per cent of the purchase price. Although most of the cars were sold on that plan, not a single default has been made on the first installment of notes that fell due. The record for payments is 100 per cent so far.

The agency is still feeling the benefits of the special advertising that was given the sale. Mr. Wolfinger says that the sales run two ahead of the schedule for the month, and the schedule calls for sales of three times as many as were sold during the month of November, 1920.

# MOTOR AGE

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## A Stronger N. A. D. A.

THE action of the National Automobile Dealers' Assn. in restricting membership to dealers who have been in business two years and who, during that period, have put themselves into a position of stability, is certainly a step in the right direction. Also, the step in raising the amount of annual dues, is a step to an upward rung on the ladder.

Any person who is at all familiar with the affairs of the N. A. D. A. must know that it has done much to elevate the position of the automotive dealer and that its efforts have not appealed as strongly as they should to the trade because this work was performed so cheaply. Dealers have not the respect they should have for this organization, because they could buy its benefits for \$10, which is a very small piece of money when the price of a motor car is considered.

There is no question that the good works of the N. A. D. A. have been seriously handicapped by the fact that the turnover in dealers has been so heavy. In no other line of merchandise does the personnel of merchants change so rapidly. When the time comes that the N. A. D. D. "goes to the front" year after year for the same personnel of membership, its cause will be greatly strengthened.

It is only right that the N. A. D. A. should serve real dealers and stop educating amateurs. Its policies should be those framed to aid the substantial dealer, the man who knows something of this business, and

who is able to pay a minimum of \$50 for that service. It is unfair for the substantial dealers of the country to be continually paying for the education of competitive dealers who are going to quit as soon as they make their first stake from the introduction of a new car into a community. When the present plan is worked out, a membership in the N. A. D. A. should become an asset.



## About Signs

SOME of the reports that one hears about the motor car dealers can hardly be believed. But too often these reports are true. Here is a report that was given first hand by a salesmanager for a distributor of a well-known and well established car that is noted for holding its dealers in line year after year. The writer would not have believed this tale of inefficiency from any but an authority.

This salesmanager had recently made a trip over his entire territory, visiting 100 or more dealers. He said that fully 40 per cent of these dealers had no car signs visible from the road. It seems incredible that a man would expect to make a living these days from an article of merchandise and not announce that fact to the public. The company manufacturing this car supplies window transparencies, window signs, pennants and other materials for dealers, and this 40 per cent of dealers had neglected these entirely.

The salesmanager and his companion were forced, in almost every community, to inquire the way to their dealer's place, and this is in a live touring territory. The percentage of the dealers in this territory who had thought it worth while to engage a bill board on the main traveled roads into their town, announcing the location of the salesroom and service department, was almost nil. Yet there is a pretty penny to be picked up in supplying tires, etc., in this territory to city car owners in the summer.

Really, can one doubt that it is necessary for factory and distributors to speak somewhat sharply to dealers occasionally? This salesmanager has not yet done this, but could you blame him if he did? Most of the more than 100 dealers that this salesmanager visited are making their living from this car and yet they do not tell the public of their wares. Indeed, one dealer sold the blank wall on his establishment for a sign for another make of car. Saloon keepers were always discounted as a type of business man, yet the saloon keeper always made it evident what kind of merchandise he sold.



## Make 'Em Pay

A YOUNG man who has given a very good account of himself as an aid in the upbuilding of ailing business enterprises, was recently called upon to devote some time to the affairs of several automotive service dealers. Each of these dealers was on the ragged edge and each feared that he would not be able to pull through the winter.

In each case this man found that the dealer was carrying a load of bills receivable that was entirely out of line with his capital and that most of these bills were long past due. In each case he asked why they had not been collected and was informed that the dealer was afraid to push the collection for fear he would lose a customer. In each case the dealer protested that the bills were perfectly good and that the debtor would "pay some time."

In one case, an especially large bill was taken in charge by the young man, as it was for a sufficient



amount to tide over the affairs of the shop in the existing crisis. Immediate collection of this bill would put the dealer in shape to meet the demands of the month and let him get in shape more leisurely on other affairs.

A letter was written to the debtor stating the case. No return. Three days later the bill was sent to an attorney and paid the same day. Two weeks later this former debtor drove into the shop with a large car and left it to be overhauled. It developed that expenses of the class in which this bill came were left to an employee and the car owner knew nothing of it until the attorney's demand was made. His only criticism of the whole affair was that the dealer had let the bill stand as long as he did. "You will have to buck up on collections unless you have more money than I have," was his remark.

It is a fact that persons who own motor cars can be forced to pay repair bills and they should not be allowed to use cars on which repair bills remain unpaid. It is only right that the service dealer get his money and get it promptly. Back of him is a cash business and he can not afford to pay cash for supplies and labor and then extend credit to the car owner—and he should not do it. In many cities and towns the dealers' associations have put their service departments on a flat credit basis and in no case has there ever been any but the most scattered reports of lost business.

As a suggestion for immediate action: get out your books, make out all overdue bills and go after the collections with the idea firmly in your mind that you are going to have all settlements completed by the New Year and after the New Year, you will go on a cash basis, with bills payable at the end of the month as the longest possible terms.



### The Flat Rate System

NOT long ago a man drove his car into a service station, which sold service on one make of car only. This man wanted his car put in shape for winter driving and to that end ordered the following work to be done.

A radiator cover was to be fitted, anti-freeze solution put into the cooling system, lighter oil was to be put into the gearset and rear axle and a parking light was to be installed. The man to whom he gave his order, that is, the service salesman, brought out a very pretentious looking repair order form and proceeded to jot down the work to be done.

He began with the radiator cover and ended with the lighter lubricant in the rear axle, and when he got through this is the way the order looked:

Install radiator cover.....	\$5.50
Two gal. Anti-Freeze.....	2.50
Install parking light .....	3.00
Wash out gearset and fill with light oil .....	
Change oil in differential.....	

In other words, it was not possible for the service salesman to tell this customer what it would cost to wash out and refill the gearset with a lighter oil and to change the oil in the differential. When the customer asked what his total bill would amount to he was told that it would cost \$11 to perform the first three mentioned items, but that "they couldn't tell exactly what the job would run" on the last two items. He was told, however, that this probably would not run over a certain figure.

The customer went out and a remark he made was overheard. He said, "It seems very strange that you can get a price on some of the work and not on some of the other work. It seems to me that a service station

which has been run as long as this one by this time should be able to tell how much lubricant it takes to fill the gearset and rear axle and how long it takes to wash these units with kerosene and put the lubricant into them."

The customer was right. Certainly, it seems that almost anyone servicing motor cars these days ought to be able to tell exactly how long it takes to perform such common operations as those cited, and there is nothing to excuse one from not knowing how much lubricant is required.

Think what it would have meant to the customer if the service man had been able to jot down each item, as he did with the three first, and put thereafter the price for the jobs, totaling up the figures and then turning to the customer saying, "Mr. Smith, the whole job will run \$13.50."



### Tell Some of the Good Points

QUITE often MOTOR AGE has criticized dealers for their failure to take the proper steps in building for better traffic conditions in their cities and for apparently countenancing conditions that were certain to have a bad effect on the attitude of the public toward the automotive vehicle.

But there are dealers who are doing their part toward better conditions. Recently, in Chicago, a man whose interest is in manufacturing an article used by the automotive industry was looking from his office window when he saw some dealer drivers racing cars. These drivers were delivering to the dealer's warehouses some new cars that had just arrived by freight. The cars carried dealer licenses. This man thought this was wrong, and he called the dealer by phone and told him of the race. That evening he was informed that this dealer had discharged three drivers and had told the other drivers why the men had been discharged.

It is only fair to both the informant and the dealer to say that both were actuated by the traffic situation that these men were causing. The danger of damage to the new cars was not the primary motive. This was a step worthy of a good dealer and the only flaw in the entire circumstance is that the dealer did not capitalize it to show the attitude of dealers toward traffic violations.



### Types of Discontent

THERE are many hundreds of men in the business who are not satisfied. Some are dissatisfied only to the extent that they are ambitious and are seeking advancement. This type is invariably optimistic and daily puts forth the best efforts possible to gain the definite objective to which they have aspired. They are constantly on their toes and usually do get somewhere. If properly managed by a capable superior, they provide the backbone of every successful organization.

This sort of dissatisfaction makes for organizational improvement and is distinctly different from the dissatisfaction born of Bolshevism.

The mechanic who is not interested in his work radiates a form of dissatisfaction that is destructive. A dissatisfaction born of a dislike for the work and a despair of ever advancing is a detriment to an organization's morale. The service foreman should know the pulse of every man in his department. Where rewards are worthy, they should be given freely. A word of counsel and encouragement here and there will do much towards installing the proper spirit. But the mechanic who is utterly uninterested lacks the mental attitude necessary to the betterment of his own interests. In the eventual weeding out process, this man should be released. It is an injustice to himself to remain at work that is distasteful to him which makes him a liability to his employer.

# N. A. D. A. Restricts Membership

## Two Years in Business Is a New Requirement

**Dues Are Changed to a Minimum of  
\$50 a Year Under Plan  
Voted by Directors**

**S**T. LOUIS, Mo., Dec. 10—Future membership in the National Automobile Dealers' Assn. will be limited to those merchants who have been in business two years, who have first-class credit and financial rating, and who carry not only the endorsement of their fellow dealers, but the confidence of their buyers. This, in effect, was the decision reached by the board of directors of the organization in the quarterly meeting at headquarters at St. Louis, Dec. 5.

Membership dues in the organization are to be changed from the payment of \$10 per year to a grade of classification of \$50 per annum as the lowest dues and \$250 as the highest. The regulations are effective Jan. 1, 1922.

"The change is made to meet the economic condition," is the statement issued by the association and signed by the board of directors, who authorized the change.

"The chief support of the association in the past," the statement continued, "has been from the larger dealers and distributors of the country who have voluntarily contributed \$100 per annum to the association's financing. The chief service demands have been made by the members who have contributed \$10 per annum.

"The time has come to make the association mean something financially to the man who has contributed deeply to its support. To be so, it must place its finances upon a larger basis in order to meet these larger expenditures needed to obtain larger benefits.

"The association has perfected a plan to render an individual service to individual members which will be more valuable to them than it costs. The association was organized largely to meet the political menaces which surrounded the industry. According to reports of association headquarters, these political considerations have largely been fulfilled, there being virtually no business of this kind now before the association for settlement. The need of the merchant of the future is something that will assist him economically, and the future policies of the association will be adapted to meet this need. While not at liberty to announce the plan at present, the trade may confidently look forward to seeing the N. A. D. A. in a new and commanding field."

The board accepted the resignation of Harry D. Austin, of Seattle, director of

the Pacific Northwest, and elected A. S. Eldridge, of Seattle, the Buick distributor there, his successor.

Announcement was made by the directors that the annual convention will be held in Chicago, Jan. 30 and 31, during automobile show week. As usual, sessions will be at the La Salle Hotel. General Manager Mook announced that a railroad rate reduction of a fare and a half had been obtained on a round trip basis. This fare is granted on the certificate plan.

It is also announced that the demand for tickets to the annual frolic are in such great demand that dealers are advised to early notify the national headquarters of their intent to attend the meeting.

## Used Cars and Contracts Before the N. A. C. A.

New York, Dec. 8—Directors of the National Automobile Chamber of Commerce decided yesterday to continue their tax program for another year with the hope that it will result in the elimination of burdensome excise taxes.

Further consideration was given to suggestions made to the National Automobile Dealers' Assn. for contract changes, and it is expected a definite report on this subject will be sent out soon.

The directors made a further survey of the used car problem and a report on investigations which has been made is expected in a fortnight.

In their discussion of business conditions, the directors pointed out that practically all companies have adopted a conservative program for the winter and that no definite plans for the next year will be made until after the New York and Chicago shows, although many companies have gone to the market for the purchase of supplies on a moderate scale.

## PARTS MAKERS START CAMPAIGN

Detroit, Dec. 9—Pursuant to a plan agreed upon among the larger units parts makers to place cars and trucks made of specialized parts in a stronger position to compete with cars made all under one roof, Continental Motors Corp. is firing the first gun in a campaign of education.

The various phases of the argument for specialized unit vehicles will be carried to the motor car buyer in turn by the other manufacturers of units who are united in the movement over their own signatures. The campaign will be carried indefinitely until the companies are assured that any possible former prejudice against the so-called assembled vehicles has been overcome.

## Combined Service Parts Depot Opened in St. Louis

**Continental, Spicer, Borg & Beck  
and Timken Are Associated  
in Missouri Venture**

**S**T. LOUIS, Dec. 10—The Authorized Motor Parts Corp., recently incorporated in this state, has opened a service station for Continental Motor Corp. and other large parts manufacturers at 3150 Locust street.

L. A. Phillips, manager of the new company, stated that similar authorized service parts depots existed in New York, Chicago, Kansas City, San Francisco and other large cities throughout the United States.

A complete line of Continental motors, Spicer propeller shafts and universal joints and Borg & Beck clutches and parts and Timken commercial axles and parts will be carried in stock.

Phillips says that the policy of the Authorized Motor Parts Corp. depot is to aid the dealer who is handling a car equipped with any of the above mentioned parts to give immediate service to the car owner when he needed parts manufactured by any of these companies.

## GMC Research Head Predicts 50 to 100 Miles Per Gallon

Detroit, Dec. 10—Fifty and 100 miles per gallon of gasoline is a development in the motor car industry not far removed, C. F. Kettering, president of the General Motors Research Corp., and vice-president of the General Motors Corp., told "gold medal men" of the Cadillac Motor Car Co. at a dinner at the plant recently.

"Increased mileage will come about through a change in the method of refining gasoline," Kettering said. "We know there now is a constructive attitude on the part of the oil companies to refine oil along the right lines. It is possible today easily to double the mileage and, when this has been done, a lot of trouble with the automobile will be solved, such as elimination of carbon and crankcase dilution."

President H. H. Rice of the Cadillac company was master of ceremonies. The promotion of A. U. Widman to be new production manager was announced.

## TO MAKE WHEELS IN CANADA

Toronto, Dec. 10—The syndicate of Toronto, Montreal and Hamilton capitalists, which has formed the International Wheel & Rim Co., Ltd., to manufacture a double disk steel automobile wheel under the Culp and Crenan patents, is making arrangements to get into production. Joseph N. Crenan is president and general manager of the company.



# Industry Awaits Turn of Year

## Automotive Industry Leads in November Employment

**U. S. Department of Labor Figures Show That Vehicle Building Is on the Upgrade**

WASHINGTON, Dec. 9—Increased activity in the automobile industry was the one bright spot of the industrial situation for November, according to an analysis of reports from special agents of the United States Employment Service, Department of Labor, from 1428 firms usually employing 501 or more persons, located in 65 principal industrial centers of the country. The report shows that the line of prosperity which started on an upward swing during August and September showed a tendency to recede during October and November. Iron and steel continued to add to its forces, but industry as a whole remains inactive. The employment survey says: "Other industries show little change, with the exception of the automotive industry, which apparently has recovered from its seasonal inertia, and is again adding to its forces."

Reports from 231 of the principal industrial centers clearly indicate that owing to seasonal and climatic conditions, unemployment is increasing, and there is no prospect of material change during the next three months. The most optimistic tone is that industry will hold the gain made in the past three months, but very little, if any, of the present unemployment will be absorbed before spring.

The automotive trade is classified as "vehicles for land transportation." This also includes other vehicles, but motor equipment predominates. The data shows that employment increased in this industry 2.7 per cent in November, as compared with the previous month, the actual increase from the firms reporting to the government amounting to 4531 workers.

Reports from 70 automobile firms in Detroit show that 4398 workers were recently added to their forces, bringing the total employed up to 115,802. Half of this number are working on part-time schedules.

In Dayton, O., automobile industries are working on a conservative basis and are careful about over-stimulation. The report shows that part-time employment in Toledo is more prevalent in the automobile industry and accessories. There is the usual seasonal falling off in the automobile parts and accessory industry in Milwaukee.

### COUPE LEADS IN SALES

Columbus, Dec. 10—With the approach of cold weather and the holiday season, demand for passenger cars in Columbus

and central Ohio territory has slowed down materially. But this usually happens at this time of the year, and has been discounted by dealers and distributors generally.

Enclosed cars are still the best feature of the passenger business. Dealers are reporting many sales of enclosed cars. The coupe is probably the most popular, although there are quite a few calls for sedans.

## Continental Will Produce Two New Lines of Engines

Detroit, Dec. 10—Continental Motors Corp. is about to start production on two new distinct lines of engines—a light six to be known as model 6Y, which is designed to enable manufacturers who have been building big sixes exclusively to build a smaller vehicle, rounding out their line; and a special bus model for vehicles of 4½ to 5½ tons, which will be known as model 4L.

Manufacturers using the light six engine will build it into cars selling at about \$1,000 to \$1,200, and it is expected that cars thus equipped will be seen at most of the shows of the 1922 season. With the light six, the Continental passenger line will now include the light, medium and big six, in addition to its special models manufactured for special factory designs.

The bus model is specially designed to meet speed requirements and lubrication facility. The truck models made by the company are also undergoing revision along lines permitting of greater speed.

### BATTERY MEN ORGANIZE

Detroit, Dec. 9—A battery chapter of the Michigan Automotive Trade Assn. was organized here this week with about 20 battery dealers and distributors signing as charter members. A thorough canvass will be made of the state to bring into the chapter all of the reputable companies engaged in battery work.

The fundamental principle laid down by the chapter is to restore public confidence in the work of battery dealers, and to do this the association will stand back of all work done by members. Protection against appropriation of "loaner" batteries, and against unfair legislation will be features of the organization's work.

### YELLOW HAS NEW MODEL

Chicago, Dec. 12—General Manager Charles Gray of the Yellow Mfg. Co., says that the entire output of the plant has been sold up to April 1 and that production for 1922 will exceed that of the present year by 50 per cent. A new limousine type cab will be placed on the market soon by this company. The new vehicle has a wheelbase of 120 in., as compared to the 109 in. of the present model. The seats are so arranged that all five passengers may face forward.

## New York Show Expected to Mark Upward Sales' Slant

**Many New Models and Reorganized Concerns Will Add Volume to Output**

NEW YORK, Dec. 13—Motor vehicle manufacturers have adopted a conservative attitude pending developments after the turn of the year, and the output for December will be the lowest of any month since the tide turned at the end of February. This is the usual seasonal condition, however, and not in any sense surprising.

All manufacturers are preparing, however, for an upturn with the New York Show the second week of January. They have gone into the market for the purchase of parts and supplies on a moderate scale so they will be prepared to meet the demands of their trade. As the year nears its end it is gratifying to note the very substantial reductions which have been made in inventories, especially by makers of passenger cars. Nearly all of them have taken their losses and are in position to go ahead on a solid foundation in an era of exceedingly keen competition.

The slowing up in production this year has been delayed much longer than was generally expected, especially in view of the unusually large number of important announcements which are expected at the big shows. It is probable the number of new models which will be displayed for the first time at the New York exposition will establish a new record. They also will embody greater value for the money and will evidence a determination on the part of engineers to keep down maintenance costs in the way of fuel and servicing.

Reports of combinations, especially in the parts and truck fields, are becoming more definite and announcements are expected in the near future. It is probable the next few months will bring important changes in the automotive map. One of the most important of these impending announcements relates to a plan under which some of the most important unit parts makers will group themselves together for the establishment of service stations and sub-stations at strategic points.

Predictions that November shipments would exceed those of the same month last year proved correct and they ran over the mark by approximately 10 per cent. Another gratifying point was that they fell off less than last year in comparison with October.

Production in January probably will be expanded by new and reorganized companies which will be getting under way by that time on something of a quantity basis.

## Five-Year Contract for Rickenbacher Distributors

### New Company Is Giving Attention to Used Car Problem Before Naming Its Dealers

DETROIT, Dec. 9—Distribution of the new Rickenbacher car will be through a strong distributor organization working upon a five-year contract with the factory. By March 1 distributors will have been named in 25 to 30 leading centers of the United States, and additional territories will be allotted as fast as production at the plant permits.

In determining upon the five-year contract as the basis of its sales relationships, Capt. E. V. Rickenbacher, vice-president and director of sales of the company, said he regarded it as the only suitable basis upon which a substantial dealer should be asked to operate. Because of the long tenure of the contract, Rickenbacher said great care would be exercised by the company in naming its representatives, which accounted for the apparent delay in announcing its sales organization.

Under the contract no dealer can either forego his obligations or be removed by the factory except for cause. Every dealer will be protected against loss through price reductions by special clause guaranteeing against this. Territorial lines will be strictly drawn and enforced.

No dealer will be required to handle the Rickenbacher line exclusively, the only obligation in this respect being that he handle no other car in the general class of the Rickenbacher. By handling two or more non-conflicting lines, Rickenbacher declared, a dealer can make substantial reductions in his overhead, and a competent dealer, he said, can handle several lines with equal fairness to all.

The company is carefully considering the used car problem, but it is considering it from the angle of the dealer who has been successful in meeting and profiting by accepting trade-ins. Substantial dealers have not been unduly affected by accepting trade-ins, Rickenbacher said, and the Rickenbacher sales organization will be dealers of this type.

Distributors in New York, Boston, Philadelphia and Chicago will be named before New Year's, and distributors in other main centers will be added from time to time until March 1. When fully organized, the distributors will number about 80, Rickenbacher said. These will be expected to handle a production of 12,000 to 15,000 cars in 1922.

### SOUTHEAST PROSPECTS BRIGHT

Atlanta, Ga., Dec. 10—Retail automobile sales in Atlanta during November, including new and used pleasure cars and new and used trucks, averaged about eight per day, total sales for the month being materially less than for October. The primary demand was for low-priced and medium-priced cars and light trucks,

mainly Ford, Dodge Brothers and Buick. As a whole, conditions are much better than they were at this time a year ago, and the outlook for the coming year is many times better than it was in December, 1920.

In the larger cities of the southeast, passenger car and truck sales during November have been in about the same ratio as in Atlanta, but in the smaller and rural communities comparatively few sales are being made. Tractor sales are holding up fairly well, especially in industrial lines.

### Encouraging Figures from Pacific Coast Business

Seattle, Wash., Dec. 9—Sales of tires and accessories continue to hold up well, according to reports from leading dealers. Sale of tires for October as compared to October, 1920, showed increase of 30.4 per cent. Supplies of all kinds, however, for the same months declined 12.7 per cent.

Twenty firms report that sales of tires from Jan. 1 to Oct. 31, 1921, as compared with the same period last year, is 15.6 per cent less. Supplies in general show a decline of 36 per cent. This condition is general along the Pacific coast.

A directory company gives from its local branch information that 97 per cent of all automotive agencies in Seattle have survived the period of depression. Eighty-eight per cent of repair firms are operating, according to figures from the same source. The 12 per cent comprise small concerns which organized with shoestring capital and lacked staying power, according to the company.

### DEALERS GUESTS AT MEETING

Galva, Ill., Dec. 9—Henry county automobile dealers were guests last week of the Hayes Pump & Planter Co., and H. J. Rumsey of Chicago, of the Vesta Battery Corp., spoke upon credits and collections. William Soderberg, president of the Henry County Automotive Assn., presided.

## Passenger Car Shipments for November Exceed Those for the Same Month of 1920

NEW YORK, Dec. 9—Reports of November shipments of passenger cars and trucks, as compiled by the National Automobile Chamber of Commerce, show that they exceeded by nine per cent the total for the same month of last year. It was the first month to show a gain over last year.

Another cause for gratification is the fact that November shipments declined only 21 per cent from the October total, while last year November shipments were 27 per cent less than for October. The shipment figures by months for this year and last follow:

	Carloads		Driveaways		Boat	
	1920	1921	1920	1921	1920	1921
January .....	25,057	6,485	29,283	3,185	.....	93
February .....	25,505	9,986	43,719	7,507	.....	99
March .....	29,326	16,287	57,273	9,939	.....	75
April .....	17,147	20,187	64,634	14,197	.....	1,619
May .....	21,977	18,608	74,286	15,193	.....	2,381
June .....	22,516	20,269	60,746	18,834	8,350	3,947
July .....	23,082	19,470	52,342	15,320	8,702	3,725
August .....	23,386	20,350	34,060	14,250	7,095	3,565
September .....	20,804	20,150	24,431	13,550	5,469	3,580
October .....	17,209	17,325	14,127	11,257	2,519	2,300
November .....	13,253	14,061	9,497	10,509	659	1,385

## Paige Factory Preparing Used Car Advertising

### Direct Effort Will Be Made to Move Stock Now Bothering Dealers by Featuring Stability

DETROIT, Dec. 9—Decided that one of the principal causes for the failure of used car demand has been lack of confidence in the integrity of the dealer offering the car, Paige-Detroit Motor Car Co. has planned a campaign of background advertising designed to build up a greater feeling of reliability.

The advertising copy will be prepared at the Detroit offices and will be run in papers in any city in which the Paige dealer will assume 50 per cent of the cost. This advertising will only serve to create confidence. The dealer must run his own ads describing the particular cars which he has to offer.

The feature of the background adds in the guarantee that all cars are strictly in the condition represented and that money will be refunded if they fail to perform up to the standard set. Where formerly it was the custom to run three new car ads to one used car insertion, this practice will be reversed for the time necessary to clear stocks of used cars held by Paige dealers.

Folders have been prepared at the factory illustrating the best arguments for the purchase of used cars, which will be furnished to dealers at the price of printing.

### REO MEN ENTHUSIASTIC

Columbus, O., Dec. 10—Dealers and salesmen handling the Reo line of cars in 22 counties in central Ohio were called together by the Capitol Motor Car Co., 36 South Fourth street, local distributor, for a sales conference previous to the opening of the 1922 season. The salesmen were generally optimistic. H. H. Knight, president of the Capitol Motor Car Co., entertained the salesmen and agents at dinner.



## Willys Corp. Receivership Is Quiet After Peace Meet

### Conflicting Interests Announce That Court Tangle Was Due to a Misapprehension

TOLEDO, Dec. 14—Willys Corporation affairs appear to have settled quietly into preparation for reorganization of the company. The terms of the agreement on receivership are being carried out in New York districts and in the naming of Robert H. Richards as local receiver in Delaware. It is expected Judge Killits will be asked this week to name Col. Francis G. Caffey as third receiver in this district.

NEW YORK, Dec. 12—An amicable agreement for the settlement of the tangled affairs of the Willys Corp., now in receivership, was reached Dec. 5 at a conference which was the climax of a series following the action of the bank creditors in having C. O. Miniger and Frank Kennison, of Toledo, ousted as receivers for the property in New Jersey. They were the original receivers appointed by Judge Killits in Federal court at Toledo.

Under the plan which has been agreed upon Miniger will remain as receiver in all districts acting with Col. Francis G. Caffey, of this city. Kennison will be retained as a co-receiver in Ohio and Judge Killits will be asked to approve Caffey for his district.

All interests have announced that they will be satisfied with this arrangement and will work together harmoniously to straighten out the affairs of the corporation. All court actions will be withdrawn and it is expected a plan of procedure will be decided upon which will be satisfactory to everyone.

The agreement may be regarded as a victory for John N. Willys, who has contended from the first that he acted only for the best interests of all concerned. When it was agreed to file a receivership petition in Toledo, it was urged by Willys that Miniger be named as one of the receivers and the bank creditors' committee be asked to suggest a man to act with him. The course decided upon carrying out his original recommendation.

A statement issued at the close of the conference stated that the receivership was due to a misapprehension. An erroneous report that interests in the east intended to take court action reached other interests in Ohio and the west and they filed their petition with Judge Killits. An identical petition was filed with Judge Knox in the United States District Court here and he appointed Miniger and Kennison.

Definite plans have not yet been evolved for the straightening out of the difficulties of the corporation. The Elizabeth plant is the only unproductive unit and it is considered certain that an effort will be made to sell this property. The New Jersey receivers announced

Saturday that they would attempt at the earliest possible moment to get rid of it and that the first chance to buy would be given the bank creditors. The "peace conference" may modify this plan in some respects, but not the determination to get rid of the Elizabeth property. All interests now are agreed that beyond the sale of the Elizabeth factory there should be no dismemberment of the corporation and that the various other plants should be operated under its direction.

A statement has been issued by the United States Light and Heat Corp., Niagara Falls, asserting that it is not involved in the receivership and that the only connection between it and the Willys Corp. is that its preferred stock is owned by the Willys Corp.

The amicable agreement which has been reached is expected ultimately to result in payment of all debts and the preservation of substantial equities for the various classes of stockholders through reorganization and refinancing under the receivership.

### JUDGE FIXES STORAGE RATES

New Haven, Conn., Dec. 9—According to a ruling of Judge Edwin S. Thomas, in the United States District Court here today, storage rates of more than \$15 per month for automobiles holding pending confiscation proceedings will not be allowed. The ruling is considered to be of especial importance, in view of the large number of automobiles which have been seized in the campaign to prevent the illegal transportation of liquor.

The case which brought the ruling about involved a bill for \$240 presented by a Stratford garage owner for storage of an automobile for eight months, as "live storage" at \$30 per month. Judge Thomas believes that such cars should be considered as "dead storage," and that \$15 a month for such storage is sufficient.

### FIRE IN AUTOMOBILE ROW

Fitzgerald, Ga., Dec. 10—A full block in automobile row here was burned a few days ago, damage estimated at \$300,000 being caused. The service stations and salesrooms of the Fitzgerald Overland Co. and the Automotive Sales Co. were among the buildings destroyed, while the building occupied by the Thurmond Auto Co. also was heavily damaged. The entire block is to be immediately rebuilt to be occupied again by automotive service stations and salesrooms.

### TALKS SERVICE ACCOUNTING

New York, Dec. 9—An explanation of the fundamentals of service station accounting by H. C. Trent of Willys-Overland, Inc., and an interesting talk on personality by H. C. Spillman, were the features of the December meeting of the Automotive Service Assn. of New York, held here recently. Trent gave a detailed analysis of mechanics' accounting, supplementing his remarks with sample forms. Spillman dwelt on the importance of developing the power of organizations.

## N. A. C. A. Strong Against Overloading and Speeding

### Resolution Passed by Manufacturers' Body Leaves No Room for Doubt as to Attitude

NEW YORK, Dec. 9—Directors of the National Automobile Chamber of Commerce, at their meeting here today, went on record unanimously as opposed to the overloading and overspeeding of motor vehicles. This action was taken in reference to the ruling made by highway and motor vehicle authorities in the State of Connecticut that any person desiring to register a commercial motor vehicle for an increase over its load capacity must obtain from its engineering department a certificate to the effect that in the opinion of the manufacturer such vehicle is capable of being safely operated under all conditions when loaded to the increased capacity. The resolution adopted in reference to this proposal and then by the directors today follows:

Whereas, the National Automobile Chamber of Commerce has consistently opposed the overloading and overspeeding of motor vehicles for the safety of the public, the protection of the investment of the operation, and the protection of the reputation of the manufacturer, and

Whereas, the National Automobile Chamber of Commerce is convinced that it must continue to oppose the overloading and overspeeding of motor vehicles for the protection of the public highways over which such vehicles operate, and for the protection of the motor vehicle industry against restrictive legislation practically prohibiting the economic operation of motor vehicles—particularly the operation of trucks engaged in the transportation of people and products, and

Whereas, certain states have enacted laws permitting the registration of motor vehicles with a carrying capacity in excess of the manufacturers' rated carrying capacity upon the production of a certificate from the manufacturer that such motor vehicle can be "SAFELY OPERATED" "UNDER ALL CONDITIONS," "AT ALL TIMES," and some manufacturers have given such certificates, and

Whereas, it is the conclusion of the National Automobile Chamber of Commerce that the giving of such certificates authorizing the carrying of loads in excess of the rated capacity of such motor vehicles under the conditions of such laws, is dangerous because of, FIRST, contingent liability on the manufacturer in case of accident, both personal liability and property damage; SECOND, claims under the manufacturer's warranty for breakage and defects resulting from overloading authorized by such certificates; THIRD, for the far more important reason that the acquiescence of motor vehicle manufacturers to overloading will be immediately seized upon by legislators as a basis for further restrictive legislation and higher license fees, and will immediately deprive the manufacturers of the cooperation of the Bureau of Public Roads of the Department of Agriculture, the State Highway Commissioners and public road officials, in their attempt to reach a practical solution of the highway problem in its relation to motor vehicle transportation; and FOURTH, the granting of certificates by manufacturers permitting overloading violates not only every engineering and manufacturing principle, competitive selling, and can only result in misunderstandings and sales resistance, as having once departed from a national understanding and enforcement of the manufacturers' rated carrying capacity, there is no limit on overloading that can be accepted as a standard.

Now, therefore, be it resolved, that the National Automobile Chamber of Commerce hereby reaffirms its policy of being unalterably opposed

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## Trade-ins "Pep Up" New Car Business, Declares Dealer

**Sells 197 Used Vehicles on Confidence of Public in Firm's Integrity and Methods**

NEW HAVEN, Conn., Dec. 9—Importance of the used car department in developing and maintaining a successful automotive sales and service business is not appreciated by many and should be given much more attention than it now receives, according to E. H. Dowson, of the White Motors Co., Studebaker distributor and used car dealer. Not only does he believe that the used car department can be made to "pep up" ordinary automotive business during the so-called dull months, but "we realize that the most successful used car dealer is naturally going to be the most successful new car dealer."

He says that during the year and up to Nov. 11, his concern sold 197 used motor vehicles, most of which were taken in trade on new Studebakers. Naturally, he says, the thing that has enabled the concern to sell the large number of used cars is "confidence of the public in our integrity." "Every used car we sell is first reconditioned, so that buyers of such cars here are assured of a satisfactory bargain right at the start.

"We have a large number of customers," he continues, "who buy a used car from us every year or two, and we have a great many people riding in new Studebakers who started in with us as customers by buying a used car. Their satisfaction in their investment has, of course, been responsible for their return.

"We do not, as some automobile dealers do, look at the used car as a necessary evil; we look at it as a good business proposition which, if properly handled, assists us to sell new cars. Looking at it this way, we have a feeling of enthusiasm for each used car we take in for sale."

Dallas, Tex., Dec. 9—What is to be done with the used car?

No question is of more importance in the minds of Dallas automobile dealers.

Special sales are being staged. Special prices are being made. Special terms are being offered. The used cars are being moved, but there are vast supplies of them remaining on hand.

Discussing the used car question, at least three Dallas dealers declared there are now 3000 used cars for sale in Dallas. This represents \$1,500,000 of good automobile money tied up in used cars.

And Dallas is not an exception to the rule. The same condition applies to all Texas. Retailers who are in position to know say that, conservatively estimated, there are now 20,000 used cars for sale in Texas. Placing the average value of these cars at \$500, the total value would be \$10,000,000.

The situation, according to the retailers of Dallas, was brought about by un-

usual circumstances. Early in the summer a bumper cotton crop was reported. Fancy prices were being paid for the cotton and better prices were expected. The automobile men sold cars in flocks. They took used cars as part payment in many cases, expecting to sell these to that line of trade which wanted a car but would make a used car serve the purpose. The cotton crop fell short by a third or more and the price was cut in half. The money was not found to buy the second-hand cars, and the dealers were left with them on their hands. The same situation obtained in grain. The crop was short and the price shorter, and the market for the used car was killed.

Sales have been held in San Antonio, Houston, Galveston, Beaumont, Fort Worth, Waco, Orange, Wichita Falls, El Paso, San Angelo and other places.

## Business Lessons Learned in 1921

NEW YORK, Dec. 9—The Motor and Accessory Manufacturers' Association asked its 400 affiliated manufacturing concerns this question:

*What is the paramount lesson learned by the automotive industry in 1921?*

*The overwhelming majority of the responses indicates that the chief fundamental lesson learned by the automotive companies during the year was the necessity of maintaining conservative, balanced inventories.*

*Corollaries of this mentioned by most of the companies were the danger of over-expansion and over-optimism; the menace of "over" overhead; the necessity for rigid but sound economies, and the elimination of "rainbow-chasing."*

*General conservatism in buying, greater prudence in making commitments and closer period buying are mentioned by virtually all the executives who contributed to the symposium as last year's principal contribution to business wisdom.*

*Another significant recurrent note in most of the statements is the lesson learned by manufacturers that the viewpoint of the ultimate consumer must to a greater extent guide production and distribution policies.*

## HOLDS GARAGE FOR CAR THEFT

Atlanta, Ga., Dec. 10—A decision of considerable importance to the automobile industry was rendered here a few days ago by the Superior Court, the case involving a Cadillac automobile left for repairs at the Cadillac station here and stolen from the garage. The owner of the car, W. D. Manley, sued the Cadillac Co. of Atlanta for \$2700, the value of the car, the court bringing a verdict in favor of the car owner for this amount.

## Tire Sales Exceed Output For Year Ending Oct. 31

**Excess Over-Production Taken from Stocks in Storage—Industry Keeps Up Well**

NEW YORK, Dec. 10—Production of pneumatic casings by the tire manufacturers who are members of the Rubber Association of America, which means approximately 97 per cent of the total production in the country, for the calendar year ended Oct. 31, was 19,645,248. Shipments for the same period totaled 22,133,940. The excess over-production was taken from the stocks in storage, which stood at 5,170,920 at the end of November, 1920, but which had been reduced at the close of October last to 3,545,030. Production of inner tubes for the calendar year totaled 24,417,229, while shipments were 26,292,718. This excess also was taken from the stocks on hand, which had been reduced at the close of October to 4,732,016. Solid tire production aggregated 377,823; shipments, 530,897.

Production of pneumatic casings in October amounted to 1,928,271, and was almost identical with the production in September, when the total was 1,929,268. There was a sharp falling off in shipments in October, however, the total being 1,675,169, as compared with 2,047,929 in September. Shipment figures were the lowest since March, when they were 1,614,651. Inner tube production fell off from 3,274,828 in September to 2,843,918 in October. Shipments, however, were 2,016,371, as compared with 2,645,758 the previous month.

## N. A. C. C. Strong Against Overloading and Speeding

(Continued from page 31)

to overloading and overspeeding of motor vehicles and that it condemns the practice of giving certificates authorizing the loading of motor vehicles beyond the manufacturers' published rated carrying capacity, and urges its members to discontinue the granting of such certificates; and be it

Further resolved, that the National Automobile Chamber of Commerce continue to cooperate with the Bureau of Public Roads of the Department of Agriculture, the State Highway Commissioners, and other public road officials, in stamping out the overloading and overspeeding evil for the safety of the public and the protection of motor vehicle transportation over the highways; and be it

Further resolved, that a copy of these resolutions be forwarded to the Bureau of Public Roads of the Department of Agriculture and the National Association of State Highway Officials.

The motor truck committee adopted another resolution suggesting to Highway Commissioner Bennett and Motor Vehicle Commissioner S. Toeckl of Connecticut that they rescind their ruling and adhere strictly to the text of the state law.

## STEPHENS CHANGES IN CHICAGO

Chicago, Dec. 12—Louis Geyler, Dort distributor in Chicago territory, has been awarded the distributorship for the Stephens line.



## Rolland-Pilain Cars for the Indianapolis Race

**Newcomers in American Contest  
Will Enter 122 Cu. In. Engines;  
Fiat Likely to Return**

PARIS, Nov. 28—Victor Hemery, Albert Guyot, Louis Wagner and Pietro Bordino are among the European veteran race drivers who may be expected to take part in the next 500-mile race at Indianapolis.

Hemery and Guyot are members of the French Rolland-Pilain team, and now assisting in the production of a set of 122 cu. in. cars which have been entered for the French Grand Prix race. Five cars are being built, two of them being intended for Indianapolis and the three others being reserved for the French classic. Guyot, captain of the team, is well known at Indianapolis, having raced there three times for Delage and Ballot. Hemery has never been on the Hoosier track, but is well known in America by reason of his participation in Vanderbilt, Savannah and American Grand Prix races, usually aboard Benz cars.

This race will be the first appearance of Rolland-Pilain in America. Owing to the French Club having adopted a two-liter, or 122 cu. in., limit for 1922, the firm is obliged to race at Indianapolis with cars having one-third less piston displacement than the others. The minimum weight for the French race is only 1433 lbs., and, obviously, the French machines will not exceed the minimum imposed under the Indianapolis rules. With their low weight, and the fact that no stop ought to be made for gasoline or tires, Guyot believes that the 122-in. Rolland-Pilains can compete against the 183-in. machines for 500 miles.

Louis Wagner and Pietro Bordino are negotiating with the Fiat company, to send two of their eight-ahead 183 cu. in. racing mounts to Indianapolis. These cars were finished too late for the last French Grand Prix, and have only been raced once, at Brescia, Italy, last September, where they broke world's road records.

This will be the first appearance of Fiat racing cars in America since the war. Wagner, who is of French nationality, has taken part in various American races since 1902. Bordino, an Italian, was formerly mechanician to Lancia, and rode with that driver on Fiat cars in Vanderbilt and Savannah races.

### CORBITT TRUCK PRICES

Henderson, N. C., Dec. 10—Corbitt Motor Truck Co. has announced the following prices on its 1922 models: H, 1-ton, \$1400; E, 1½-ton, \$2200; C, 2-ton, \$2600; B, 2½-ton, \$3000; R, 3-ton, \$3200; A, 3½-ton, \$3800; AA, 5-ton, \$4500.

### BUSINESS GOOD IN CLEVELAND

Cleveland, Dec. 9—Business in Cleveland improved greatly in November over the previous 30-day period, according to

a survey that has been made by the Cleveland Association of Credit Men.

The credit men sent a questionnaire to many merchants in the city and in the list were automobile retail salesmen. They, with few exceptions, reported that there was a healthy increase in November over the previous month. So far as the 1920 November record is concerned, it has been left far behind.

Sixty-four per cent of the merchants questioned about November business reported that it was better than in October; 18 per cent said it was stationary, and 18 per cent said their volume of sales was lower than in November.

## Ryan Not in Merger With the Durant Interests

New York, Dec. 12—Allen A. Ryan, who previously has played an important part in the development of the automotive industry, has taken over a large block of stock of the Durant Motors Co. of Indiana, a subsidiary of Durant Motors, Inc., and will act in a brokerage capacity in handling its sale. This stock will be listed on the curb market and trading in it is expected to be brisk.

Wall street has been speculating for some time over the possibility of a financial combination between the Durant and Ryan interests, but it can be stated on authority that Ryan simply is acting as a broker for W. C. Durant and his associates. It also can be stated positively that no negotiations are pending for the amalgamation of the Stutz Motor Car Co., with which Ryan has been closely identified, with Durant Motors.

### THE SMALLEST ACCESSORY

St. Louis, Dec. 10—A company to manufacture in St. Louis and to market the smallest automobile accessory known is being organized under the name of L. B. Tebbetts & Co., Inc., by L. B. Tebbetts. The accessory is a key clip for keeping accessible the two keys which motorists ordinarily carry. The keys are held by two clips and a third clip fastens the device to the pocket.

### INSURANCE COMPANY REMOVAL

Kansas City, Dec. 10—J. B. Sackett, president of the Union Insurance Co. of Wichita, Kan., announces that he and his associates have taken over the Motor Mutual Indemnity of Kansas City and will move its home office to Wichita. It was organized in November, 1920, but has done almost no business. It is the purpose of the new management to write fire and theft insurance on automobiles.

### BIG P.-A. CONTRACT

Buffalo, N. Y., Dec. 10—The Pierce-Arrow Motor Car Co. has been awarded a contract for 87 pieces of motor equipment for the municipal government of New York City, at a contract price understood to be very close to \$350,000. Seventy-five of the units will be equipped with dump bodies and 12 will become parts of the city's flushing fleet.

## Newspaper Organizes an Enclosed Car Exhibition

**Publisher Undertook Administrative  
Work on Guarantee of Certain  
Amount of Advertising**

BIRMINGHAM, Ala., Dec. 9 — With practically every automobile dealer in the city entered, the enclosed car show held in the Birmingham Packard Motor Co. garage has proved a success.

The three-day exhibit has been engineered almost in its entirety by the Birmingham News, the space, decorations and service being supplied the dealers on condition that at least half a page of advertising be contracted for by each of those participating. The dealers entered into the proposition with enthusiasm, and the result has been an instructive attraction of such success that several other cities in the south are taking steps to put on similar exhibits.

Newspaper cooperation with the automotive industry in Birmingham has resulted in such education of the public along motor lines that the effect has been felt to a marked extent by the dealers.

The success of the exhibit warrants the assertion that it will be repeated in the future.

### U-S-L MADE IN CANADA

Toronto, Ont., Dec. 12—The manufacture of Canadian-made U-S-L batteries has started in the new factory of United States Light and Heat, Ltd., in Niagara Falls, Ont. The same design and the same standard of quality that have marked the U-S-L product in the past will be found in the new Canadian-made batteries.

### TAXIS "COMMERCIAL VEHICLES"

Harrisburg, Pa., Dec. 9—Under a new ruling of the automobile division of the State Highway Department, taxicabs are classed as commercial vehicles, instead of passenger cars, as heretofore, and the minimum registration will be \$15, instead of 40 cents per horsepower with a minimum of \$10.

### U. S. MARKETS NEW TUBE

New York, Dec. 9—A new inner tube has been placed on the market by the United States Rubber Co. It will be sold under the name of "Royal Tube" and will be of the same general quality as the Royal cord tire. Improvements in construction are said to give the tube increased life and greater adaptability to repair work.

### G. M. C. BUILDING PLANS

Detroit, Dec. 10—General Motors will begin work to complete finishings on its office building here soon after the first of the year. By June 1 it is hoped to have the entire structure ready for occupancy. Most of the interior work on the west wing remains to be done.

## Jewett Motors Inc. to Name Dealer Terms at N. Y. Show

### Paige Organization to Market New Car to Sell in Medium Class Field

**D**ETROIT, Dec. 9—Jewett Motors, Inc., has been formed as a subsidiary of the Paige-Detroit Motor Car Co. to manufacture a six-cylinder car, to be called the Jewett, which will sell in the light car medium class field. The car will be first shown to dealers in the Hotel Commodore during New York show week and the selling price and sales features will be announced at a dinner to be tendered Paige dealers by the company. The car will be made in the Paige factories in Detroit, but by an entirely separate working force and a separate company.

Officers of the new company are headed by H. M. Jewett, president of Paige. The Paige company has adopted a standard of practice which all its dealers will be advised to follow beginning with the introduction of the new car.

### DEALERS SPLIT ON SHOW

Rochester, Dec. 9—The expected break in the ranks of the Rochester automobile dealers was reached here when most of the motor truck dealers agreed to exhibit at the New York State Horticultural Society's meeting and exhibition to be held here Jan. 11, 12 and 13, a week before the Rochester motor car show.

The decision to eliminate all truck and commercial car dealers from the Rochester automobile show caused somewhat of a furore in local automobile circles, and immediately the dealers set out to discover some means of staging a truck show. Truck dealers decided to affiliate with the horticultural society, which was more than glad to have them, figuring on boosting the attendance, especially since tractors also will be shown.

### FOLLOW TRACTOR COURSE

Columbus, O., Dec. 9 — Practical courses in the operation of tractors and gasoline engines, under the auspices of the Ohio Department of Education will be given in many sections of the Buckeye state during the coming winter. The first will be held in Hamilton township, Franklin county. It will continue for three weeks and will start the second week in December. The courses will continue until about March 1.

### DENIES PIERCE-ARROW CHANGES

Buffalo, Dec. 10—Reports that changes in the executive personnel are planned by the Pierce-Arrow Motor Car Co. were emphatically denied by Myron Forbes, treasurer of the company, following their circulation in New York and elsewhere. Mr. Forbes said this subject was not even discussed at a directors' meeting held in New York on November 29. He said no changes in personnel or policies are contemplated as far as he or other directors know.

## IN THE RETAIL FIELD

Miller Rubber Co. has opened a factory branch in the Triangular building, long the home of the Chevrolet retail store, in St. Louis.

Apperson-St. Louis Motors Co., Apperson distributor in St. Louis, has been purchased by the Apperson Bros. Automobile Co.

Briscoe-Liberty Motors Co., St. Louis, has succeeded to the business of the Briscoe Motor Sales Co. and the Bishop Truck and Tractor Co. in that city.

Campbell-Niedringhaus Co., Lee tire distributor in St. Louis, has opened a retail store at Grand avenue and Lindell boulevard, that city.

Aldrich-Stephens Motor Co., St. Louis, has been taken over by the Oneida Motor Truck Co. and has become a factory branch.

Republic Motor Truck Sales Co. has opened a factory branch at Vandeventer and Washington avenues, St. Louis. Carl Simons, recently district manager for the Studebaker Corp., is manager.

C. A. Thomas, an independent service dealer at 121 East Town street, Columbus, O., has bought the service business of the Barlow Motor Sales Co. and will operate the latter place as the State-Fourth Garage.

Everett Motor Co., Huntsville, Ala., suffered a loss of about \$12,000 by a fire caused by a car exploding in the service department.

R. D. Argo, a veteran automobile man, has opened a large service business in Jasper, Ala.

Lorenz Bros. have been made Franklin distributors at Lansing, Mich.

S. A. Miner, Pierce-Arrow distributor in Hartford, Conn., has completed a new building and now has his sales and service departments under one roof.

Jordan Springfield Co. has been incorporated in Massachusetts to sell the Jordan car at Springfield. Herbert L. Handy, senior and junior, are promoters of the company.

Edgar Updyke, of Indianapolis, will again become identified with the distribution of the Stutz car Dec. 15. During the last year Updyke has been identified with Locomobile interests.

Covey Motor Car Co., of Portland, Ore., has changed its line from the Dodge to the Maxwell and Chalmers. The company also handles the Cadillac.

John F. Zak Motor Co. has acquired the Auburn for sale in connection with the National.

Kinsey-Rutherford Co. has succeeded the Overland Co. in Peoria, Ill. The officers will remain the same, and the capital stock has been increased from \$18,000 to \$60,000.

Power Farming Machinery Co. has been organized to sell a line of automotive and other power farm equipment at Ottawa, Ill. H. J. Battendorf is prominent in the company.

Talbott-Farry Co. has been organized at Decatur, Ill., to sell Ford cars. J. B. Talbott and T. N. Farry are both former Firestone branch managers.

Edward Fedash, Kankakee, Ill., has opened an automotive equipment store and will specialize in tractor service.

Kirby Automobile Co., Champaign, Ill., has greatly increased the business space by leasing the Flatiron building, which will be remodeled.

Jacksonville (Ill.) Automotive Dealers' Assn. has joined with other business organizations of that city in an endeavor to erect a building suitable for automobile and other industrial exhibitions.

R. M. Chipley & Bro., until recently Packard dealers at Raleigh, N. C., have been made distributors. Their territory was formerly a part of that controlled by Thomas C. Hunt, of Greensboro.

Stanley Bros. Battery & Service Co., Kansas City, has been organized by F. M. and C. H. Stanley, for retail sales and service, succeeding to the business of the Whitaker Battery & Supply Co., now wholesale only, at 1601 Grand avenue.

E. G. Perrine, of Canon City, Colo., has taken over and reorganized the Anderson agency in that city.

### COAST EQUIPMENT SHOW

San Francisco, Dec. 9 — The Pacific Coast Automotive Equipment Exhibition (the third annual event of its kind here) will be held here, Jan. 21 to 26, 1922. The Pacific Exhibition Company is putting it on, and headquarters have been opened at 346 Hayes street.

Cosgrove Automobile Co., of Charleston, S. C., has purchased for \$100,000 the building occupied in that city by the Overland-Palmetto Co., which will remove Jan. 1 to the building occupied at present by the Federal Motor Co., occupying a new building next door to its present location.

W. S. and E. C. Fuhr have been named distributors for the Anderson car in Wheeling, W. Va.

W. L. Heil of Yorkville, O., is a new Anderson dealer.

Henry C. Stacey Co. has been organized as distributor of the Anderson car in the Philadelphia territory. Stacey was formerly located at York, Pa.

C. D. Lafferty has been made Anderson dealer at Kokomo, Ind.

Anderson Motor Sales Co., of Charleston, W. Va., has been organized by J. C. Carper, W. G. Carper and E. C. Rinard, the latter being a veteran car dealer.

A. T. Nevels, a former horse trader at Hartford, Conn., has completed the rebuilding of his plant to convert it into a 100 per cent automobile garage and service station.

Boulevard Garage, Hartford, Conn., has been opened by Fred Vincent, who has been service manager for some of the leading car dealers in that city.

Joseph Bennett, for several years identified with the Ford interests in New England, has opened a salesroom and service station in East Hartford, Conn.

Everett Johnson, of Hartford, Conn., has retired as an independent service dealer to accept the place as service manager with the Bennett Hartford Co., of East Hartford, Conn.

H. G. Kirkland, formerly in the Kirkland-Cravens Motor Co., is retail sales manager of the American Motors Co., Haynes distributor, Kansas City, Mo.

Gridley Motors, Inc., H. N. Genung, general manager, Peerless Distributor, has taken new quarters, with sales, service and executive departments on the ground floor, at Sixteenth and McGee streets, Kansas City, Mo.

Buxton Motors, distributor of Scripps-Booth, Kansas City, has taken downtown retail sales for Overland and Knight cars.

Hutchings-Snyder Motors, Inc., has been organized in Kansas City, succeeding the Kirkland-Cravens Co. as distributor of Maxwell and Chalmers. Walter Cravens, a banker of Salina, Kan., is president; G. R. Hutchings, for a year sales manager of Kirkland-Cravens, is vice-president and general manager; H. R. Snyder, formerly manager of the branch at Salina, is vice-president, and J. C. Hodge secretary. The Salina branch is known as the Salina-Hutchings-Snyder Motors, Inc. The Kansas City plant will occupy, Jan. 1, a four-story building at Eighteenth and McGee street, where sales and service will be under one roof.

McGraw Tire & Rubber Co. has leased a two-story modern building at 1817 McGee street, for service to Kansas City territory. J. H. Greer is manager.

Peake Auto Supply Co., Kansas City, is occupying its new building at Sixteenth and Oak streets.

Master Truck Sales Co., 1617 McGee street, Kansas City, is distributing Master trucks in Kansas, Oklahoma and Missouri. E. Hale O'Brien is president, C. D. Cook vice-president and Frank A. Wheeler secretary-treasurer. The company is adding a one-ton truck to its line.

C. T. Dunkle Motors Co., Columbus, O., recently chartered with an authorized capital of \$1,000,000 for the purpose of marketing a dozen lines of automobiles and operating a huge central service station and garage, has acquired a site on Front street, near Gray street.

Badger Auto Sales Co., of Plymouth, Wis., has been appointed Chevrolet dealer.

Whitaker Battery & Supply Co., Kansas City, has moved its wholesale plant to 209-11 East Twentieth street, discontinuing retail.

### ENGINEER SEEKING ALLEN PLANT

Bucyrus, O., Dec. 8—L. A. Sommer, designer of the motor for the Allen car, is understood to be negotiating with the receiver for the Allen Motor Car Co. with a view to purchasing the plant and using it to manufacture motors.



## Alabama Association Active in Road Bond Campaign

### This and Other Constructive Questions Will Come Before the Annual State Convention

MONTGOMERY, Ala., Dec. 9—The Alabama Automobile Dealers' Assn. will hold its annual convention in Montgomery, Jan. 23, according to J. B. Farly, secretary of the organization. Between 150 and 200 automobile dealers are expected.

One of the oldest organizations of its kind in the south, the Alabama Automobile Dealers' Assn. has, since its inception in 1915, been continually active in the interests of the automotive industry, particularly in reference to the prevention and the correction of laws unjust to the automotive trade. No small part of the interest in good roads has been stimulated by the activities of the association.

The used car question will be an important topic of the convention.

Another of the association's activities will be in regard to the campaign for the \$25,000,000 road bond issue, which will again be submitted to the voters of the state on Jan. 30. The former bond election, in support of which the association waged an active campaign, was declared invalid, necessitating that a new election be held. The association expects to take an active part in this new bond issue campaign, as Alabama is badly in need of better roads.

Other subjects of general interest will be taken up and efforts made toward the perfecting of a plan for placing the association on a sound basis.

## Automotive Vehicles Lead All Buffalo Industries

Buffalo, N. Y., Dec. 10—For the first time the production of automotive vehicles and their parts now hold first place among the city's industry. The Buffalo Year Book, just issued on the basis of Federal government statistics, shows the automobile industry to have stepped from third to first place among the industries of the city.

To do so the industry has passed the flour and grist mill products and meat slaughtering and packing industries, which occupy second and third places, respectively. The announcement that the automotive industry had taken first place created much comment here, as the city's other industries have grown rapidly during the last decade and it was believed they were holding their positions.

### I. H. C. STORING SPEED WAGONS

Springfield, O., Dec. 10—Within the next week, the Springfield works of the International Harvester Co. will open with nearly a normal force, according to announcement made by Superintendent C. H. Smith. The plant has been running "light" for several months. Out

of a normal force of 1500 men, about 700 or 800 men will be put to work soon. Production of the light speed motor truck will soon be brought up to 25 trucks per day.

"We will continue producing speed trucks until the limit of the storage facilities at the local works is reached," said Smith. "All of the trucks which were in storage have been moved out now. Orders for trucks are being booked, and the outlook is steadily growing more encouraging. The gray iron foundry has been opened with a force of 75 men."

## Twenty-six Firms Listed in Associated Motors

New York, Dec. 9—Substantial progress has been made in the last few weeks in negotiations for the formation of the big automotive merger which will be known as the Associated Motor Industries, a Delaware corporation with a capital of \$80,000,000. The roster of companies which will be included now contains 26 names, including established companies not only in the parts field, but in the passenger car and truck branches of the industry. One of the purposes of the merger will be to assure the parts companies which will be included a definite amount of business each month through the sale of the motor vehicles which will be controlled by the parent company.

Promoters of the enterprise assert that ample financial backing has been obtained to insure its success and they declare negotiations now have reached a point where the merger can be called an actuality. One of the cardinal points in the merger plan is a scheme for financing dealers in its products and those who purchase them.

### COLUMBUS WILL HAVE SHOW

Columbus, O., Dec. 10—Preparations are being made by Columbus agents for the annual Columbus Automobile Show, to be held either the latter part of February or early in March, the exact date not having been fixed as yet. The show is expected to be the signal for a good spring business, and dealers believe that trade early in 1922 will be active. With industrial conditions gradually improving, it is believed that the public will be in the market early in the year for motor cars.

### BUDA PARTS DISTRIBUTOR NAMED

St. Louis, Dec. 10—The Buda Engine Service Co., 2111 Olive street, has been appointed by the Buda Engine Co. as its official representative and authorized parts distributor in eastern Missouri and southern Illinois.

The company shares the premises of the Master Truck Distributing Corp. A. W. Slaybach, well known in the truck field in St. Louis, joined Ewald C. Smith and T. H. Sonnenberg, who founded the Master company, in the conduct of the Buda Service Co.

## General Association Gives Way to Specialization

### Passenger Car Organization Is the First Unit in New Grand Rapids Scheme

GRAND RAPIDS, Mich., Dec. 9—The Automobile Business Assn. of Grand Rapids has been dissolved and the physical assets of the organization taken over by the Grand Rapids Passenger Car Dealers' Assn. Responsibility for carrying out the program for the balance of the year with regard to paid employees and enterprises under way has been assumed by the passenger car association.

The principal reason for the dissolution of the former association is that it became unwieldy because of the number of interests represented in its membership, which were at times conflicting. Comprised in it were radiator men, sheet metal workers, garagemen, truck dealers and accessory dealers, and interest in the association dwindled because the discussions at meetings were found to lack general appeal.

It is expected that a number of new organizations, each representing one of the groups, will now be formed, with a plan for general meetings for subjects of common interest. M. D. Elgin, secretary of the former association, will be secretary of the Passenger Car Assn., which will have ample funds for carrying out a program outlined to further the interests of the passenger car business.

## "Little Six" Hanson at the Big National Shows

Atlanta, Ga., Dec. 10—George W. Hanson, president of the Hanson Motor Co., authorizes the statement that the company will shortly start the manufacture of a new model to be known as the Little Six. It will have a 112-in. wheelbase and will be a companion car to the present line of sixes manufactured by the company. No price is yet fixed, but it is said that it will list for less than \$1,000 and be the lowest priced six-cylinder car on the American market. The new car will first be shown at the New York and Chicago shows and then at the Atlanta show.

### COLORED FRONT LIGHTS BARRED

Buffalo, N. Y., Dec. 10—An automobile may be called a "boat," but the designation doesn't authorize the use of red and green lights on the car. This is the substance of a decision handed down in a test case brought by police here to put an end to the practice of using colored front lights on automobiles. Judge Albert A. Hartzel ruled that colored lights are improper and fined the defendant in a test case a nominal fine of \$5. The court held white lights must illuminate the front of a car and must light the roadway for a distance of 200 ft. in front of the car.

## "Buy 'Em Right" Is N.A.C.C. Answer to Trade-in Problem

**Makers Have Part in Solution as  
Well as Dealers—Advertising  
and Appraisers to Help**

NEW YORK, Dec. 10—The survey made by the National Automobile Chamber of Commerce in the hope of finding some definite means of solving the used car problem shows that two definite plans seem to be most favored by automobile dealers. The first of these would be acted upon by the manufacturers and the other would be supported by the dealers. The proposals are:

1—Each manufacturer, in advertising his new cars, to advertise also the market price of his older models.

2—Dealers in each locality to authorize one or more public appraisers similar to real estate appraisers, who, for a fee paid by the dealer, will give the sales value of any car submitted by dealer or customer.

In explaining these plans in an address before the Washington (D. C.) Automotive Assn., the following explanation was made by Alfred Reeves, manager of the N. A. C. C.:

"Under the first plan the manufacturer will advertise the sales price of his older models in good condition, based upon reports from around the country. It should not be necessary to give values of cars less than 18 months or more than four years old.

"The plan would give some protection to the new car dealer because a customer could hardly ask for a greater allowance than he knew could be obtained for his used car. Any dealer exceeding this allowance would do it with the knowledge that he is inviting a loss, which he is apt to take by promptly selling the car at the known sales value. This plan, it is felt, would increase respect for the second-hand car.

"Under the second plan, the dealers in each locality would appoint a certain number of appraisers to appraise second-hand cars offered in trade. These men at proper quarters, with experts, would judge the condition of the car and issue a certificate to the owner, giving a value that would be recognized by all dealers.

"The dealers would pay a fee of \$2 or more to the appraiser, who would be entirely independent of any particular dealer. He would be appointed for his ability, just as certain real estate appraisers are recognized by real estate firms. Such a plan would give dealers a true knowledge of the value of the car.

"Owners of used cars, unfortunately, overestimate their value, and where there is no official appraisal in opposition, they are generally good enough salesmen to sell the dealer a car for more than its worth.

"No matter what plan may be finally approved by manufacturers and dealers, the fact remains that the used car problem will continue to be a menace until the dealers learn enough about values

## CONCERNING MEN YOU KNOW

John F. Lockwood, president of the Lockwood Manufacturing Co., Kansas City, which went through bankruptcy a few months ago, has filed petition in bankruptcy, obligations being chiefly endorsements on Lockwood company paper pertaining to matters disposed of in the Lockwood proceedings. Lockwood is elderly, and has practically no assets. He has recently been an employee of the Baker-Lockwood Mfg. Co., which bought the Lockwood assets at receiver's sale.

P. H. Hart, recently with Price, Waterhouse & Co., has been elected treasurer of the Good-year Tire & Rubber Co., succeeding H. H. Springfield, who becomes assistant to the president.

L. C. Clare, formerly with the Hudson Motor Car Co., has been made personnel manager for the Leach-Biltwell Motor Car Co.

R. T. Torian, of Atlanta, has been made district sales manager for the Anderson, covering several southeastern states.

O. J. Hubbard, formerly identified with the export work of the packing industry, will supervise sales of the Anderson car in South America. Recently Hubbard has been in the automobile sales business at Seattle, Wash.

Harry B. Marshall, for 12 years manager of the district office of the Electric Storage Battery Co. of Philadelphia, has been promoted to manager of the railroad sales department of the company. T. P. O'Malley is acting manager of the St. Louis branch.

Charles Walker, of the Knight Motors, Inc., was a recent lecturer in the course at the Michigan State Auto School.

Bertram A. Doran, recently in the Orient for the General Motors Corp., has sailed from New York as special representative of the Maxwell-Chalmers in the Far East.

W. J. Shay, recently with the Champion Spark Plug Co., has been made sales manager of the automotive division of the Columbus McKinnon Chain Co., of Columbus, O.

W. C. "Fuzzy" Anderson, long identified with the Ford interests, has organized the Anderson Sales Co., with offices in the New Market Bank building, St. Louis. This company will market the Brevard Light, a home lighting equipment. Associated with Anderson is Thomas G. May, for a long time connected with the Ford interests.

Thomas H. Byrne, a veteran automobile man in St. Louis, has been made manager of the passenger car division of the Packard Motor Car Co. of Missouri.

Joseph H. Alfred has been made assistant to A. C. Barber, Willys-Overland sales manager. Alfred has been with the company for several Car Co.

George H. Layng has resigned as vice-president and manager of manufacturing of the Cadillac Motor Car Co., to accept the same offices and responsibilities with the Peerless Motor Car Co.

to buy second-hand cars enthusiastically, for a profit."

Reeves contended that the real fundamental in the solution of the problem is to take in the used car at the right price, "which means a price that will enable it to be sold at a profit."

## Yellow Cab Mfg. Co. Declares 100 Per Cent Stock Dividend

Chicago, Dec. 9—The Yellow Cab Mfg. Co. of this city has declared a 100 per cent stock dividend on Class "B" stock, subject to the approval of the directors, and increased the cash dividend rate from \$7 to \$7.20, payable in monthly installments of 60 cents each. A special meeting of the stockholders will be held in January to approve the increase of the outstanding capital of the company to 100,000 shares.

The market value of the stock dividend is \$4,325,000, although the par value is only \$500,000. The new rate is equivalent to \$14.40 a share on the old stock. Class "B" stock is represented by 50,000 shares, \$10 par, and pays annually \$7 in quarterly dividends. This stock has risen from the low in March of 74 to high of 178; Dec. 5. Earnings of the company from Jan. 1 to Nov. 30, this year, are said to have been \$1,400,000, and, in addition to this, the unfilled orders on the books will keep the factory at capacity production for three months or more. On account of the repeal of the excise profits tax it is said that no cars will be shipped during December, the business being carried over until January.

## CHICAGO MAKERS LOCALIZE SALES

Chicago, Dec. 10—Chicago motor truck manufacturers, with but one or two exceptions, are confining themselves to sales in the local territory. They are not going out of Chicago and immediate

territory to keep up their low rate of production, and with some this is to be the practice rather than an expediency. Exceptions to this rule are: the Available Truck Co., which reports that its sales are greater than for a long time and are scattered over a wider territory through the efforts of a greatly reduced force; Diamond T sales are strong in Chicago, as they have always been, and this company will continue a strong competitor for local business. Chicago Motor Truck, Inc., is closed down at the present time taking inventory, but will open after the first of the year on scheduled production of one truck a day.

## ALENA STEAMER TRUCK

Indianapolis, Dec. 10—The Alena Steam Products Co. of this city makes the statement that it will go into production of a five-ton and two-ton steam truck and a steam tractor as soon as it can build a factory.

## HINDS IN NEW COMPANY

Chicago, Dec. 9—O. Q. Hinds having sold his interests in and disconnected himself with the old Anderson Electric Equipment Co., of Chicago, has associated himself with B. J. Grigsby, O. E. Grigsby and W. C. Grunow in a new company to be known as the Grigsby-Grunow-Hinds Co., and early in the new year will begin the manufacture of a high grade line of automobile accessories.

## FORD LEADS CALIFORNIA SALES

Sacramento, Calif., Dec. 9—Ford cars led the sale in California last month with 1742, Chevrolet was second with 823, Dodge came third with 544, Studebaker next with 331 and Buick fifth with 289.

In trucks, Ford led with 152 and Reo with the nearest second of 33. These figures are given in the report of Charles J. Chenu, superintendent of the California Motor Vehicle Department.



## BUSINESS NOTES

W. A. Thompson, a lumberman manufacturer, is the head of a company that is building a plant at Cordele, Ga., for the manufacture of automobile storage batteries. One unit of the plant is nearing completion.

The board of directors of the Jordan Motor Car Co., Cleveland, O., at a meeting this week, declared a quarterly dividend of 1 1/4 per cent on the preferred stock, payable on Dec. 31, to stockholders of record Dec. 10.

Durant Motor Co. of Indiana has elected these officers: W. R. Willett, president; H. W. Alger, first vice-president in charge of sales; A. Henninger, second vice-president and production manager; H. F. Herbermann, secretary; C. F. Daly, treasurer. The directors are T. W. Warner, chairman of the board; W. C. Durant, W. R. Willett, H. W. Alger, A. Henninger and C. F. Daly.

Western Reserve Mills Co. of Georgia, at Quitman, manufacturers of automobile tire fabrics, has completed development operations began early in December. The plant is owned by the Mason Tire & Rubber Co. of Kent, O., recently being acquired by outright purchase, and the fabric manufactured will be used entirely in Mason tires.

Zahner-Fawler Equipment Co., 500 Delaware street, Kansas City, pursuant to resolutions of the directors, has filed petition in bankruptcy. It lists about \$15,000 worth of merchandise obligations, an equal amount in notes and endorsements of the officers, and about \$25,000 in assets, chiefly machinery.

Ruggles Motor Truck Co., Saginaw, Mich., which recently acquired the Huron Motor Truck Co., has elected the following officers and directors: Frank W. Ruggles, president; W. J. Wickes and Julius B. Kirby, vice-presidents; Ezra L. Smith, secretary; Charles T. Kerry, treasurer; John F. O'Keefe, counsel; directors, the officers and Benton Hanchett, Otto L. Dittmar, R. T. Robinson, Guy S. Garber and Walter C. Hill, all of Saginaw; Harry H. Price, Columbus, O.; John J. Thorne, Bay City; John Ryan and Albert E. Sleeper, Bad Axe.

### Draft Uniform Law to Rule Oregon Bus, Truck Traffic

Portland, Ore., Dec. 9—Automobile bus and freight lines in Oregon may be put under the direction of the public service commission or some other commission, to be regulated much as are other common carriers and public service corporations, according to a movement now under way in that state. A special session of the legislature has been called for early in the coming year to act upon the matter.

Those now framing a new bill are contending that motor buses should be regulated by the granting of certificates of public necessity or convenience, without which a bus line might not operate, these certificates to be revoked by the commission in cases of irregular or unsatisfactory service. Further restrictions on truck weights may be proposed, but these will be strenuously fought, as Oregon is now declared to have one of the three most stringent regulations in the United States.

A strong movement is also on foot to have included in the bill a provision putting enforcement of traffic laws in all but the larger cities of the state in the hands of a state highway patrol.

Governor Olcott has appointed a board of five men to hold sessions between now and the time of the opening of the legislature and to study the problem of bus and truck regulation and to take testimony from all sides. The board is

American Southern Motors Corp., Greensboro, N. C., has changed the name to the Irving Automobile Co. The company manufactures the Vaughan, a custom-built car.

O. G. Roberts has been appointed receiver for the Nash-Columbus Co., 78 North Fourth street, Columbus, O., upon the application of the Nash-Ohio Co.

Ashland Tire & Rubber Co., of Ashland, O., has opened a direct factory branch at 52 North Fourth street, Columbus, O., which is under the charge of George W. Egan.

Portage Rubber Co., Akron, O., has been incorporated with an authorized capital of \$1,500,000 to manufacture casings and tubes. The incorporators are: Francis Seiberling, Robert Gunther, J. B. Huber, R. L. Brannan and C. E. Hamlen.

Safety Products Co., Cleveland, O., has been chartered with a capital of \$50,000 to manufacture automobile lenses and other accessories. The place of business is at 4300 Euclid avenue. Incorporators are: R. E. Watts, H. O. Dunkle, M. T. Gaston, R. L. McCarthy and M. C. Haugh.

Federal Judge Westenhaver, of Cleveland, has postponed for two weeks decision on the request of Receiver Frank A. Scott of Standard Parts Co., for permission to sell the Canton forging plant.

American Turn-Auto Co., which was chartered under Ohio laws but later formed into a partnership consisting of Howard M. Bettett and R. C. Penfield, the latter of Bucyrus, has taken over the American rights and patents formerly held by the Turn-Auto Co. of Columbus, manufacturers of a device to turn an automobile over on its side while making repairs. The office is located at 40 West Gay street.

Inner-Guard & Rubber Co., organized in St. Louis to manufacture and market an inner tube with special puncture-resisting qualities, has opened offices in the Bank of Commerce building as a preliminary to opening a factory to manufacture the tube. Louis Goodhart is president of the company.

composed of Sam Kozer, secretary of state; John B. Yeon, member of the State Highway Commission; Fred A. Williams, chairman of the Oregon State Public Service Commission; Frank M. Warren of Portland and Edward Cusick of Albany, Ore.

### SHOW FEATURES REBUILT CARS

San Francisco, Dec. 9—An individual display of used cars, in a well-lighted and handsomely decorated salesroom, has proved profitable to Don Lee, distributor of Cadillacs here. The whole salesroom of the new building was given over to the used-car department for a complete display of open and enclosed models of rebuilt Cadillacs and some other rebuilt cars. The results were better than the firm anticipated, and the rebuilt-car show will be made a feature every few months throughout the year.

### GARFORD LOWERS PRICES

Lima, O., Dec. 10—The Garford Motor Truck Co. has reduced prices on its entire line of trucks, the reductions ranging from \$100 to \$340. The 1 1/4-ton chassis at \$1990 is \$100 under previous price and the 2-ton chassis is reduced \$340, from \$3190 to \$2750.

### CORRECT MAXWELL PRICES

The price of the Maxwell touring car and coupe models is \$885. Due to a typographical error in the description of the new models on page 13 in the Nov. 10, 1921, issue of Motor Age, this price was given as \$850.

## Gotham Show Week Busiest in History of the Industry

### Preparations Under Way for Many Annual Banquets and Assn. Meetings

NEW YORK, Dec. 9—With interest in the coming New York show keener than ever before, the national organizations of the automotive industry with headquarters here are making unusually elaborate preparations for the week which is the busiest of the year for them. The number of exhibits at the show itself will establish a new record, and an unusually large number of announcements which will be important to the trade are expected.

Preliminary arrangements are well under way for the annual dinners to be held during the show. The Rubber Association of America will dine at the Waldorf, Monday evening, Jan. 9. The first dinner of the Old Timers' Assn. will be held the same evening. The dinner of the National Automobile Chamber of Commerce will be held at the Commodore, Tuesday evening; that of the Motor and Accessory Manufacturers' Assn., Wednesday at the same hotel, and the banquet of the Society of Automotive Engineers will be held at the Astor, Thursday evening.

The annual meeting of the Rubber Association of America for the election of officers will be held at the Waldorf, Monday afternoon. The annual meeting of the M. A. M. A. will be held at the Commodore, Wednesday afternoon. The directors of the N. A. C. C. also will meet Wednesday. A large number of more or less incidental meetings of dealers and committees will be held during the week. It is probable manufacturers will devote more than the usual amount of attention to arousing the interest of dealers.

### GOODRICH HALVES INVENTORY

New York, Dec. 12—In the first nine months of this year inventories of the B. F. Goodrich Co. were reduced from about \$72,000,000 to \$38,000,000. This reduction necessitated increased production to maintain adequate inventories in finished products.

During the same period the bank indebtedness has been reduced by over \$23,000,000 and it is expected that the company will have entirely liquidated this indebtedness by the end of the current year.

New York, Dec. 12—Balance sheet of Goodyear Tire & Rubber Co., as of Sept. 30, 1921, showed current assets of \$67,000,000 or \$10,000,000 in excess of \$57,500,000 aggregate bonds and debentures outstanding. Under sinking fund provisions of these securities the \$57,500,000 liabilities, which they now represent, will be turned into that much added book value, approximately \$60 a share, for the common stock.

# The READERS' CLEARING HOUSE

## Questions & Answers on Dealers' Problems

### TRAILING ELUSIVE KNOCK

Q—A Buick model 21-45 has developed a slight metallic knock. The car has been driven 10,000 miles, had the oil changed every 500 miles, has used the best oil obtainable and has otherwise been carefully used. The wrist pins were renewed after 5000 miles, and about 200 miles later the knock occurred at camshaft speed, either when idling slowly or up to 10 m.p.h. in high. The knock disappears entirely at 15 m.p.h. or over. Immediately before changing the oil, the knock is almost inaudible, but is very noticeable right after changing, when it is similar to a jingling sound. Valves are kept close and a feeler has been placed between the pushrod and valve, but it does not stop it. Give remedy for the above.—H. S. Holder, 120-122 W. Tenth St., Norfolk, Va.

The absence of information regarding the grade of oil used—whether heavy, light or medium—prevents a more accurate diagnosis. The fact that the knock becomes almost inaudible just before changing oil leads us to believe that one of the pistons was fitted too closely, resulting in a slight scoring or roughing of the wrist pin surface. As the pin is lubricated practically by oil that enters the hole in the top of the connecting rod, it is possible that a too heavy oil would not lubricate this tight-fitting, scored pin, until it had become thinned sufficiently through usage to reach and fill the small clearance between bushing and pin. This condition would also aggravate any tendency of the piston to slap.

Incidentally, we would suggest that you examine the present installation of pistons or connecting rods. The piston pin location in this engine is offset 3-32 in. in the pistons. These pistons are marked with an arrow on the skirt. The pistons should be so assembled on the rods that this arrow points towards the camshaft side of the engine.

### RETURNING CRANKCASE GASES TO CYLINDERS

Q—Give your opinion regarding the advantages or disadvantages of leading the gases from the crankcase back to the carbureter. Some claim that it causes more carbon, while others claim that it helps the engine along.—Hons Electric Auto Co., San Francisco, Calif.

The theory underlying the devices which accomplish the purpose in question is that the heavy parts of the fuel, which pass by the pistons without burning, are vaporized in the crankcase when the engine becomes hot, and that if they are led back to the cylinders, they will be completely burned. While the theory is excellent, we have had no definite report of how it works out. However, we are under the impression that if the heat of the combustion chamber is not sufficient to volatilize these heavy ends to the point where they will burn, the temperature of the crankcase is not high enough to do it. One very excellent feature claimed for the devices, which seems very plausible to us, is that, owing

### The Reader's Clearing House

**T**HIS department is conducted to assist dealers and service station executives in the solution of their problems.

In addressing this department, readers are requested to give the firm name and address. Also state whether a permanent file of *MOTOR AGE* is kept, for many times inquiries of an identical nature have been made and these are answered by reference to previous issues.

Inquiries not of general interest will be answered by personal letter only. Emergency questions will be replied to by letter or telegram.

Addresses of business firms will not be published in this department but will be supplied by letter.

Technical questions answered by B. M. Ikert and P. L. Dumas; Legal, by Wellington Gustin; Paint, by G. King Franklin; Architectural, by Tom Wilder; General Business questions by *MOTOR AGE* organization in conference.

to the fact that they create a partial vacuum in the crankcase, they eliminate waste of oil through the pushrod or rear crankshaft bearing.

### DETERMINING NATURE OF ENGINE NOISE

Q—A Nash car has a tapping noise that resembles a loose tappet and is very annoying, especially on a hill. This car has been driven 5000 miles and has had good care. When the engine is idling, the noise is not noticeable. These tappets are set up pretty close. Do you think this tapping noise could be a piston slap?—F. W. Leis, 608 S. Park Ave., Herrin, Ill.

A piston slap closely resembles a tappet noise in tone. It possesses characteristics, however, which distinguish it from a tappet noise. With the spark advanced and the engine laboring, it is more pronounced. Retarding the spark and declutching will diminish the sound. Before an accurate diagnosis can be formulated, the carbon should be removed, to avoid confusing a probable carbon knock with a piston slap. A tappet noise decreases in intensity under load. Inspect all bearings for looseness.

### DATA ON BUICK 37 B

Q—What year was the B-37 Buick manufactured?

2—Publish a diagram of the oil system used in this engine.

3—We intend to use a three-sight oil system, dropping oil back to the three main bearings. Will this keep enough oil in the pan and will it prove satisfactory?

4—Will I have to change the carbureter and intake manifold for the present-day fuel? It has a Marvel carbureter.

5—Where can I get a set of wheels cut down from a size 34 by 4½ to 32 by 4, and where can I obtain a new set

32 by 4?—Raymond W. Christner, Brownsville, Pa.

1—The model 37-B Buick was produced in 1914.

2—The circuit of the oil system is shown in Fig. 3. The operation is as follows: oil from the reservoir in the lower half of the crankcase passes through a strainer into the gear pump housed at the rear end of the reservoir. The pump forces it through a pipe to the sight feed on the dash, where the circulation can be observed by the driver. From the sight feed the oil returns through a distributor pipe to the side tray or trough in the lower half of the crankcase, into which the scoops of the connecting rod project.

3—As the connecting rods dip into the splash tray, they splash the oil over the interior of the crankcase up into the lower part of pistons and cylinders. As it drains back down beside the crankcase, it is caught in ducts that lead to all the bearings of the engine, the remainder falling back into the reservoir to be used over again. An auxiliary hand oil pump should be used in combination with this system to furnish additional fresh oil at regular intervals.

4—Better performance can be obtained if the manifold is equipped with one of the present-day replacement type hot-spots. The type of carbureter to be used is entirely a matter of choice. The present carbureter, if adequately hot-spotted, will handle the present-day fuel.

5—A list of manufacturers of wood wheels will be supplied by letter.

### SUPPLY TIMING SEAGRAVE ENGINE

Q—Supply the following information concerning the W. E. Seagrave six-cylinder air-cooled engine. How can I time the intake and exhaust valve? The engine has two exhaust valves, one stem valve and one rotary valve; the marks on the flywheel are not visible, as the flywheel has been shifted.—Guss Dombrook, Regina, Sask., Canada.

We have no data on file concerning Seagrave engines; however, the following valve timing will apply to any engine. We suggest that you communicate

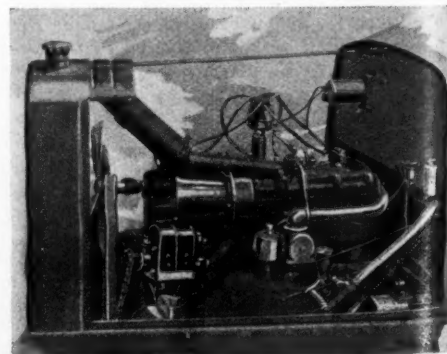


Fig. 1—Installation of high tension magneto on Saxon engine



with the manufacturer of this engine. The distances given apply to the periphery of the flywheel: intake opens  $1\frac{1}{4}$  in. past center, intake closes 5 in. past center; exhaust opens  $1\frac{1}{2}$  in. after center, exhaust closes  $2\frac{1}{4}$  in. past center; a valve tappet clearance of 20 thousandths is recommended. The foregoing instructions will bring your timing correct within one or at the most two teeth of the factory setting. The engine will run fairly satisfactorily, but difference in setting, early and late, should be tried until the best results are attained.

#### ATTACHING MAGNETO TO SAXON ENGINE

Q—Advise us as to the proper method of attaching a magneto to a model Y 18 Saxon Six. We have a magneto taken from a Richmond Six which we would like to attach, but cannot figure out just how to do it.—K. C. Jones, Versailles, Mo.

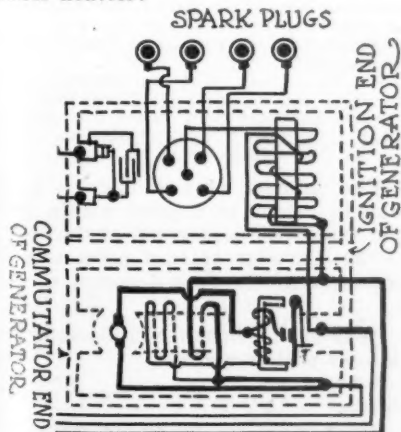
While not difficult, the value of the installation is questionable, for the reason that an excessively long chain must be employed. Removing the fan pulley from the crankshaft gives room for the installation of a gear. The fan pulley must then be mounted in front of the gear and the fan moved toward the radiator to compensate for the difference in belt equipment. The magneto can be mounted on a special platform (preferably of brass or bronze) attached to the left-hand engine support arm. As the magneto must turn at one and one-half times crankshaft speed, it must be fitted with a gear having only two-thirds the number of teeth of that on the crankshaft. Do not make the error of attempting to drive a magneto through the distributor shaft. The small gears on the distributor and the camshaft are not strong enough to transmit the necessary power. The suggested method of making the installation is illustrated in Fig. 1.

#### REJUVENATING OLD T HEAD MITCHELL

Q—What hp. will a 1919 T head six-cylinder Mitchell engine develop at a direct drive? It has a bore of  $4\frac{1}{4}$  in. This engine has been fitted with Gill piston rings and new wrist pins and has been overhauled in general. It has wonderful compression.

2—Is it a slow-speed engine?

3—Would you advise making the flywheel heavier?



WESTINGHOUSE IGNITION GENERATOR FRAME NO. 230 ON GLIDE 1915

Fig. 2—Internal diagram of Westinghouse No. 230 generator frame

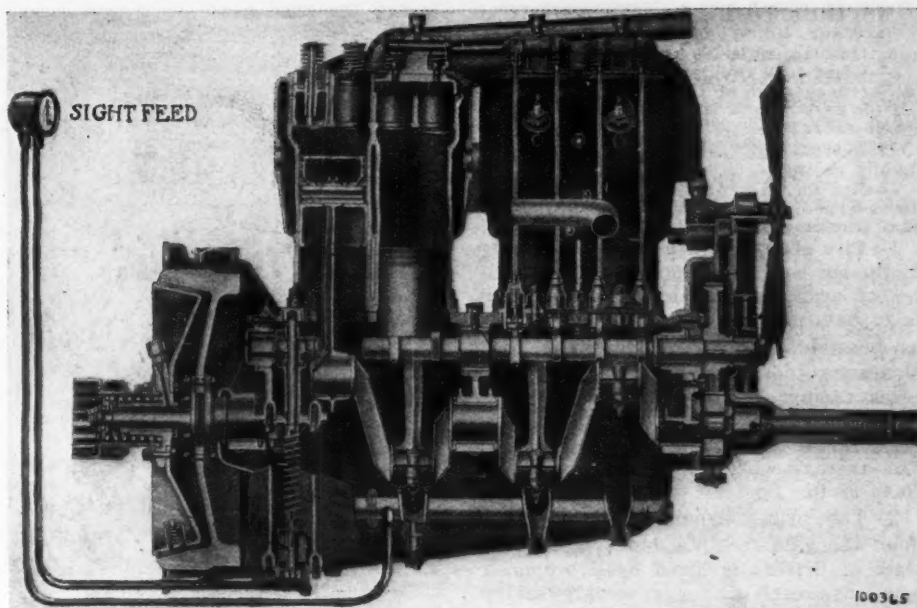


Fig. 3—Cutaway view of Buick 35 engine showing installation of sight feed in oil circuit

4—What is a good suitable carburetor for this car? Magneto?—Alfred H. Chapman, 325 Second St., Fairport Harbor, O.

1—The 1914 T head Mitchell Six was built in two models. The "Six DeLuxe"  $4\frac{1}{4}$  in. by 6 in. and the "Special Six"  $4\frac{1}{4}$  by 7 in. The maximum hp. obtained from the "Special" engine was 66 at 1500 r.p.m. The larger engine develops 70 hp. at 1400 r.p.m. At a speed of 500 r.p.m., the "De Luxe" engine delivers 31 hp., while at the same speed the "Special" shows a power output of 25 hp.

2—As automobile engines are considered, it is a slow-speed engine.

3—If the engine is to be driven direct to a slow-speed propeller, we would advise that additional weight be added to the periphery of the flywheel; this will provide smoother running at the low engine speed demanded by a direct drive propeller.

4—Communication with any of the manufacturers of the leading carburetors and magnetos will enable you to choose the type of device best suited. If it is intended to use a magneto, we recommend the self-contained high tension type for this work.

#### WATER VAPOR AND GRAPHITE LUBRICANT

Q—Do you know or have you heard of any damage being done to cylinders of automobiles through the use of a water carburetor? We have been informed that the water introduced into the cylinders is liable to rust the surface, causing pitting. We find that in this dry climate the water carburetor causes the engine to run more smoothly, giving it the working feeling that is obtained in driving an automobile in the damp of the evening.

2—Do you know or have you heard that the use of oil containing deflocculated graphite tends to foul the cylinders and spark plugs more than oil that does not contain it?—G. M. Hanson, Dawson Fuel Sales Co., Dawson, N. M.

1—We have never heard that the small amount of vapor introduced into the cylinders has the effect of rusting them, and very much question that it has, for two reasons: the vapor is mostly driven out

by the exhaust, and even were this not the case, the protective film of oil on the cylinder walls would prevent rusting. The injection of water or water vapor is not new, it having been used in kerosene-burning tractor engines for a number of years.

2—No.

#### WINDINGS OF WESTINGHOUSE IGNITION-GENERATOR

Q—Publish the internal diagram of the Westinghouse generator frame No. 230, showing the current path from the generator through the shunt and series windings and the windings of the cutout. This generator has four connections on the front end and five on the rear, and contains the breaker and distributor.—Arthur Henrickson, Auto Ignition Co., Duncan, Okla.

See Fig. 2.

#### RADIATOR REPAIRING

Q—Can you inform me how to repair radiators that leak slightly in the core and are hard to solder? Is there not a process of dipping them in some sort of cement or paint?—F. W. Lange, Atwood Garage, Atwood, Wis.

If you will refer to the MOTOR AGE winter service issue, November 3, you will find radiator repairing treated quite extensively. We know of no process of repairing radiators by dipping in cement or paint. Some of the large concerns, equipped for manufacturing, have solder pots large enough to accommodate the core face or back down. However, these units are used for assembling new cores and it hardly pays to disassemble a radiator completely for the purpose of dipping. We cannot conceive of a core repair that cannot be done with the soldering iron or the needle point flame.

#### DETAILS ON FRONTENAC FOUR RACING ENGINES

Q—Publish valve timing and power curve of Frontenac Four.—Subscriber, Bluffton, Ind.

This information is not available in our files. We suggest that you communicate with Chevrolet Brothers, Indianapolis, Ind.

### ASPIRES TO BE RACING PILOT

Q—What would be a good wheelbase and tire size for a dirt track racer?

2—What do the prizes in most dirt track races amount to?

3—Where can I get the dates of dirt track races?

4—Do you know of any books on automobile racing?

5—Can anyone enter these races or is it necessary to have some kind of license?—Wm. Jhoslein, Louisville, Ky.

1—Tire size is governed almost wholly by the car weight and position of the center of gravity. The desirable condition is to have the heavy units hung as low as possible without reducing the road clearance too low. Many of the dirt track racing cars have a road clearance of only four or five inches. The tire sizes range from 28 by 3 to 34 by 4½. The average wheelbase is approximately 90 to 98 in.

2—The prizes usually are dependent upon the gate receipts, but sometimes a team of drivers is hired by a promoter who pays each driver a weekly salary and sometimes an additional income.

3—We are unable to supply this data, as these events are run off without the sanction of the A. A. A.

4—No.

5—We have no definite information regarding this, but believe that anyone can enter these races.

### MOTOR GENERATOR CIRCUIT OF 1912 CADILLAC

Q—We are having some trouble with the self-starter on a 1912 Cadillac. The last time the battery was overhauled, the service station forgot to mark the wires which lead to the posts and some of them must have been mixed, for the battery tests up all right, but when the starter is used it turns the engine over about twice and then stops. The connections are all clean and tight and the brushes seem to be all right. We looked the wires all over and they seem to be correct.

2—Publish a wiring diagram showing the different wires and the way they connect onto the various binding posts of the battery.—Elmer Wragge, Howells Service Station, Howells, Neb.

1—We hardly believe that any of the battery units or cells were assembled reversed, for the reason that, had this been the case, they would show a marked lowering of specific gravity or a reversal when examined with a voltmeter. Rather do we believe that the acid was adjusted to too high a point, thus giving a false reading and indicating that the battery is fully charged when, in reality, it is not. Referring to Figs. 4 and 5, it will be seen that the battery terminals the nearest to the controller, as well as those the farthest away, are all of negative polarity and that the four remaining terminals are of positive polarity. Beginning with the negative terminals of group No. 1, examine each cell with a voltmeter, reversing the test points for each reading. The positive wire of the voltmeter must be applied to the positive terminal of each cell. The readings should all be to the same side of the scale and, if they are not, a reversed assembly or a reversal of the cell under examination at that moment is indicated. All four groups should be examined in the same way.

2—See Fig. 6. Also refer to Fig. 7.

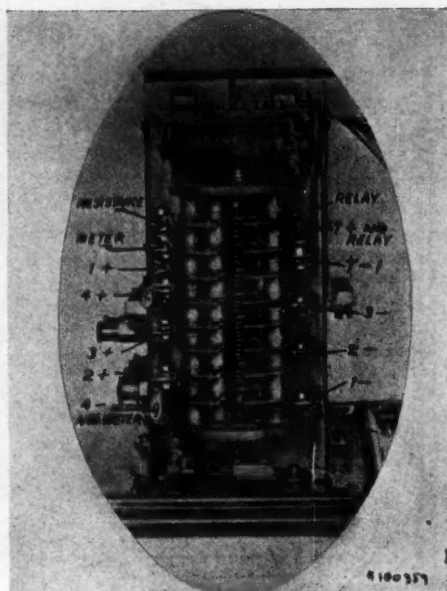


Fig. 4—Controller of Delco system as applied to 1912 Cadillac

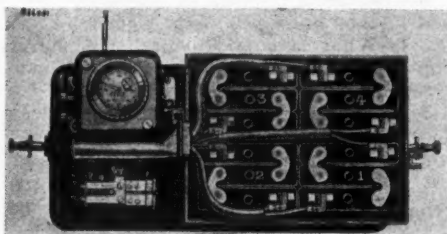


Fig. 5—Top view showing connections on battery

which shows the controller with the various terminals marked according to the terminals of the other apparatus with which they connect. All four of these illustrations apply to the following cars: Cadillac, 1912; Cole, 1913, models 4-40, 4-50, 4-60; Hudson, 1913, models 54 and 37; Oakland, 1913, models 42 and 6-60; Oldsmobile, 1913, model 53.

### CONVERTING CAR INTO SPEEDSTER

Q—The wheelbase of a Hudson 6-54 has been shortened to 110 in. Would you advise reducing this to 100 in. for mile and half-mile circular dirt track racing?

2—What is the bore and stroke of the Hudson 6-54 engine?

3—What is the regular gear ratio used in this car?

4—At what speed does this engine reach its peak of power?

5—Could the speed of this engine be increased by installing light pistons and connecting rods and facing flywheel?

6—Could the valves be enlarged? If so, how much, and would that increase the speed and power?

7—Would you recommend the use of Dodge front and rear axles and wheels on this model?

8—Where could I secure a 2½-to-1 gear for this car?

9—Is it possible to tune this engine up to turn over 3000 r.p.m., or what would be the maximum speed?

10—Give maximum speed of this engine?

11—I intend to install an F. B. engine in a Chevrolet 490 chassis, and use a 2½-to-1 gear ratio. Where can I secure a bevel gear 2½-to-1 for this car?

12—Would it be better to use a 490 flywheel on the F. B. engine?—J. W. Hunter, North Baltimore, O.

1—Yes.

2—The bore and stroke of this engine is 4½ by 5¼ in.

3—The gear ratio on the Hudson 6-54 depends upon the type of body originally used. The Hudson Co. lists six different gear ratios, from 3.26 to 1 to 2.56 to 1.

4—This engine reaches its peak of power at 1800 r.p.m., at which revolution it develops 63 hp.

5—Yes.

6—Yes, approximately 3-16 in. The amount of power gained is impossible to state.

7—We would not recommend changing the rear or front axles, but a change from the large regular wheels to the smaller ones is recommended.

8—The gear ratio of 2.65 to 1 can be secured from the Hudson Motor Car Co., Detroit.

9—It is doubtful whether this engine could be tuned to turn over 3000. If you can secure an engine speed of 2700 with this engine you have accomplished a great deal.

10—It is possible to maintain a speed of 80 m.p.h. with this car, providing you make the necessary changes in the engine and chassis.

11—The bevel gear can be obtained from any of the leading gear-cutting firms.

12—We would not recommend the installation of the 490 flywheel on the F. B. engine. If you wish to decrease the flywheel, we would recommend that you remove that much material from the F. B. flywheel.

### SOME NOTES ON EXHAUST PIPE DESIGN

Q—How long should the exhaust be for a 183 cu. in. four-cylinder engine?

2—Diameter of lead pipes?

3—Diameter of exhaust header at first lead pipe junction?

4—Diameter of exhaust header at fourth lead pipe junction?

5—Diameter of exhaust header at terminal?

6—Most desirable and practical material to make it of?

7—Gage or thickness of materials?

8—Most desirable, straight or curved exhaust line?

9—If three-inch pipe is recommended for this size engine, would a six-inch pipe cause the vacuum to lessen its effectiveness or would it assist, or would it make any difference if an oversize was used although a smaller pipe would carry off the gases?

10—Is it a fact that an engine with short lead pipes exhausting against atmospheric pressure will cause the engine to heat up?—J. R. Callum, Norfolk, Va.

1—The exhaust pipe should be long enough to extend to a point within two feet of the extreme rear end of the body.

2—The diameter of lead pipes should be the same as the port diameter at the port.

3—They should increase in diameter as the header part is reached.

4—1-3.4 in.

5—3 in.

6—Sheet steel of 12 or 14 gage or seamless tubing of same gage.

7—12 or 14 gage material.

8—Straight, wherever possible.

9—A six-inch pipe would not lessen



its effectiveness if the end of the exhaust pipe terminated at a point where the air was below atmospheric pressure, such as the rear of the tail where the vacuum of the car helps carry the exhaust from the end of the pipe. This pipe should run in a straight line along the body and end at a point about 18 in. from the extreme end of the body.

10—No. A very effective exhaust system can be built by carrying out pipes from each individual part of the rear of the body, grouping them close together as they run along the side of the body.

### ANTI-FREEZING SOLUTION, A SEASONABLE SUBJECT

Q—In what proportions should alcohol and water be mixed in radiators so as to protect against freezing in zero weather?—J. E. Burke, Springfield, Ill.

For zero weather use water 75 per cent, alcohol 25 per cent. For 10 below zero, water, 70 per cent, alcohol, 30 per cent. For 20 below zero, water, 60 per cent, alcohol, 40 per cent.

### FROM STOCK TO SPEEDSTER

Q—Give instructions for converting a Hudson Super-Six stock car into a special racer.

2—Where can we secure higher ratio gears for rear axles?

3—Do most of these cars use the regular Hudson carburetor?

4—Would you suggest any change in the regular camshaft?—McCoy-Vance Motor Co., Inc., 360 Broadway, New Orleans, La.

1—Herewith is a description of the Hudson racing car driven by Ira Vail, as submitted by the Hudson Motor Car Co. The frame is standard in every respect

except that 20 in. have been cut out of the middle just back of the transmission and the frame welded together again with reinforcements on the inside. The front and rear springs have been flattened out and leaves removed to suit the reduction in weight. The axles are standard with Timken bearings throughout and the gears used are stock gears supplied by the factory, the ratio being 2.61 to 1. This is the highest gear ratio we supply.

All parts of the engine, with the exception of pistons, are stock parts. The pistons, while of standard design—that is, having the same diameter wrist pin, with its bearing in the piston, are of "Leavitt Magralite Metal." The camshaft and timing, the valve pushrods and valve springs are stock. The valve springs have been increased in pressure by introducing washers between the cylinder casting and the top of the spring.

The standard carburetor is used in connection with the standard cylinder block. The export type of cylinder head, in which the only difference is the metric spark plug holes, is used for the obvious reason that there is less chance for plug trouble with this head, owing to the better cooling of the plug shell and a reduction of the size of the porcelain. The clutch, gear shaft, propeller shaft, and steering gear are all standard Hudson equipment, without any change whatever. The engine is fitted with the standard Delco system throughout. The radiator is smaller than standard, of course; there is no bar behind it. The bonnet and

body are special, being made of sheet aluminum and are very light weight.

The exhaust pipe is of a special type and comes outside the body and bonnet to facilitate cooling, as is common practice among racing cars. The gear ratio 2.61 to 1 referred to in the above letter from the Hudson Motor Car Co. is not recommended for circular dirt track racing, as it too high to secure proper acceleration.

To secure favorable results, the turning of the engine must be given painstaking attention. The bearings should be carefully scraped to a perfect surface, and fitted to their journals comparatively loose. The connecting rod assemblies should be carefully balanced and aligned, and a hand oil pump fitted to furnish an extra supply of oil to the crankcase.

2—From the Hudson Motor Car Co., Detroit, Mich.

3—Yes.

4—Unless expense is of no importance, we would not recommend any change in the regular camshaft.

### ELUSIVE KNOCK IN BUICK D45

Q—We have a perplexing problem to solve. A Buick 6, model D45, developed a mysterious knock that has baffled expert mechanics and everyone consulted to date. I also wrote the Buick factory, and they could offer no advice or explanation. This car seems to be in perfect shape mechanically, but, when driven under 10 m.p.h., a lashing irregular knock that is very distinct and pronounced occurs in the engine. When driven over rough ground or pavement the knock is more pronounced. When the car is driven in low, intermediate or reverse gears the knock is never heard, no matter how hard the pull or rough the road.

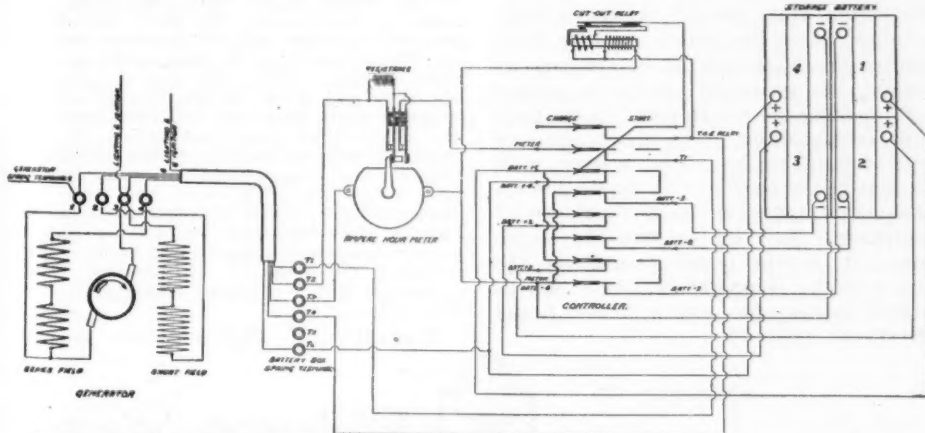
With the engine idling and the clutch thrown out, or with the gears in neutral the same slashing knock is heard. All bearings are tight including connecting rods, wrist pins, main crankshaft and camshaft bearings. The engine supports and front trunnion bearings are tight. The crankshaft cannot be sprung, as all bearings remain tight after long use. The ignition timing is correct; no carbon is in the engine; valves seat properly and are correctly timed; compression is good; and engine fires evenly with correct carburetor adjustment. A new set of timing gears has been installed but this does not correct the trouble.—Fred J. Kercheval, Rowan, Ia.

The fact that the engine knocks with the transmission in neutral, clutch pedal depressed eliminates the mechanism behind the clutch as the source of this elusive knock. Your description of the condition of this car covers everything except the flywheel and clutch spider bearings. We would suggest that you remove the clutch and carefully examine the clutch spider bearings and also note whether the flywheel is tight on the crankshaft.

### YEAR MODEL OF STEPHENS SALIENT SIX

Q—Inform us what the year model is of a Stephens Salient Six, engine No. 18527.—LeMars Auto Supply Co., LeMars, Ia.

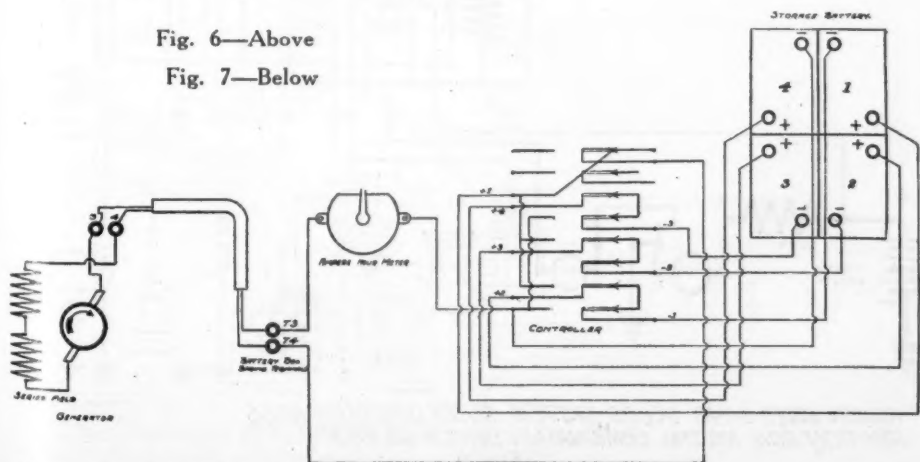
The number indicates a 1920 model, but whether early or late, we cannot say. We could have given you much more accurate service had you supplied us with the car serial number instead of the engine number.



1912 CADILLAC-DELCO CHARGING CIRCUIT

Fig. 6—Above

Fig. 7—Below



1912 CADILLAC-DELCO STARTING CIRCUIT

#100359 R

### ENGINE REPLACEMENT ON NEW MODEL ESSEX

Q—Publish the changes made in the new Essex. I understand that a change has been made in the head, pistons, and rods, as well as some other minor changes; also that the new parts can be installed in the old model Essex but that the valve timing must be changed. This is the part I am particular to know about, as I have several Essex cars to rebuild this winter and the local dealer here will not give us the information.—Harry Cunkle, Phillipsburg, Pa.

Probably the most important changes made in the Essex engine are the new cylinder head, and the new type piston. The cylinder has been redesigned particularly with the idea of giving more combustion space over the exhaust valve. A pocket is provided in which the plug is placed. This completely isolates the plug to any location which is apt to be in the path of any oil and prevents fouling. The intake passages are now arranged to give greater turbulence to the gases. The intake manifold now incorporates hot body features, due to the arrangement of the water passages which are designed to permit higher temperature at certain points where it will assist in the evaporation of the fuel. The aluminum pistons are the diagonal split constant clearance type with three rings above the wrist pin instead of two, as in the old model. The pistons are split in such a way as to give a modified slipper effect.

### ALLEN INQUIRES

Q—Publish an illustration of Stromberg Model K-1 carburetor, as used on the Model 37 Allen, and instructions for adjusting same.

2—First and reverse speeds always engage with a grinding clash, no matter what the engine speed, and high gear is not entirely noiseless. What is the answer?

3—Should the lubricant cover the lower half of the gears?

4—When this car has been in disuse for a while the clutch does not slip, but after running a little while it slips in first and second. Have washed it out with kerosene and removed plug at bottom of clutch housing. How can this trouble be remedied?

5—In the event of the cutout not functioning, how could the generator be shorted so that current would not reach an abnormal value?

6—What type of cutout is used on this car?—H. J. Enghardt, Chicago, Ill.

1—This carburetor is provided with two adjustments: the nut "A" is the low speed adjustment; the needle "B" controls the high speed jet. To adjust, close the needle valve by turning it to the right until it stops, then turn it back to the left about one and one-half turns. Start the engine and allow it to run until thoroughly warm, then advance the throttle suddenly. If the engine backfires, the mixture should be enriched by turning the needle valve to the left. When the needle valve is so set that the engine picks up without fluttering, without backfiring and without a trace of black smoke, it should be locked in position by tightening the packing nut. This completes the high speed adjustment.

To secure the slow speed or idling adjustment, the throttle should be prac-

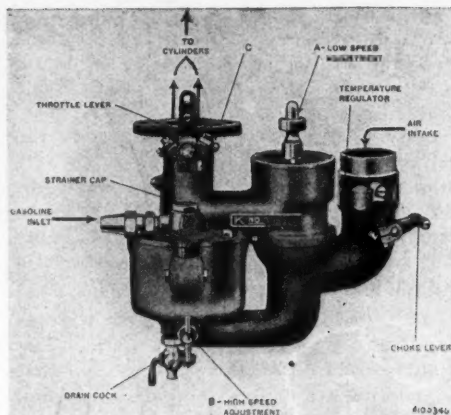


Fig. 8—Stromberg carburetor model K1, showing points of adjustment

tically closed and the spark retarded. The knurled nut "A" is an air valve adjustment, and turning it to the right produces an effect just opposite to the effect secured by turning the high speed needle valve "B" to the right. In other words, to thin the mixture, the knurled nut "A" is turned to the left or counter-clockwise. When the engine runs smoothly at idling speed the lock screw "C" is adjusted to secure the minimum engine speed, and locked.

2—These conditions indicate either a "dragging clutch" or wear in the transmission bearings and gears. Remove the clutch housing cover plate, and examine clutch brake action; the friction faces of the clutch brake should positively come together when the clutch pedal is fully depressed. This can be determined by placing the gearshift handle in neutral and blocking the clutch pedal in the fully depressed position. The clutch stamped cone should be free from contact with its seat in the flywheel; it should show a visible air space at every point on its periphery. Now try to turn the clutch cone; it should resist turning if the clutch brake is operating. If it can be turned easily, the clutch brake lining should be replaced.

3—The lubricant should come to the level of the countershaft.

4—Install new leather facing on clutch.

5—The brushes should be lifted from the commutator; this can be done by using strong cord to tie the brush holders up and clear off the commutator.

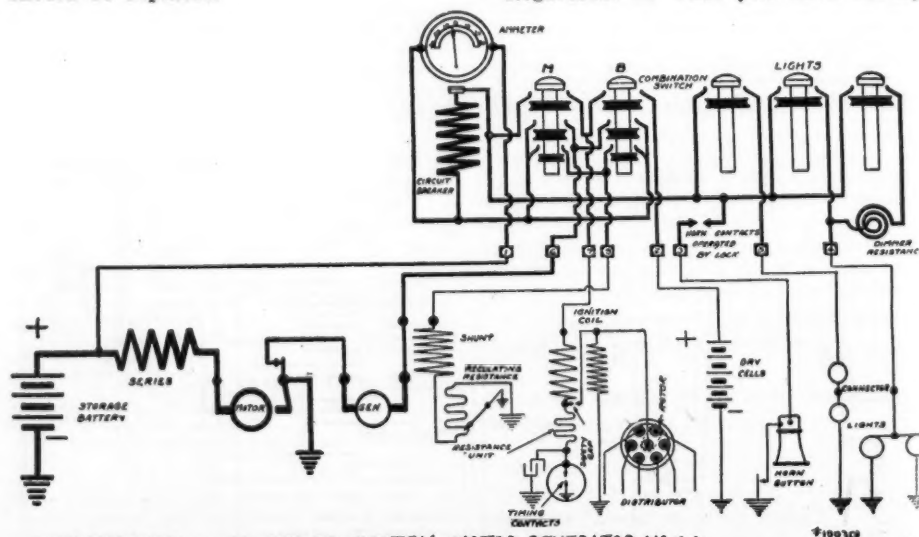
6—If this car is equipped with dimmer bulbs, the generator voltage is regulated by the third brush system. Some of the cars of the model 37 series were equipped with dimming resistance; that is, "dimming effect" was secured by introducing resistance in the lighting circuit. Cars with this dimming resistance have only one bulb in each headlight and use a vibrating regulator for voltage regulation. The device is manufactured by the Westinghouse Co. The system where third brush regulation is utilized, uses only a regular cutout or relay which can be replaced by any of the well-known makes.

### DELCO-HUDSON GENERATOR CHARGES INTERMITTENTLY

Q—We have a 6-40, 1916 Hudson with a 1916 Delco motor-generator. About three months ago we found that, on starting out, the generator would not show change on the ammeter but, by pushing the ignition switch in and out, it would be alright and show from 12 to 18 amp. the rest of the trip. It kept getting worse so we would have to do this on every new start until now we can hardly get it to start at all. When it does it always shows up strong 16 to 18 amp. Sometimes in changing from high to second speed, it will start. Sometimes in slowing up when running down hill, it will cut out. It never goes back on discharge, just to zero.

We have tested the switch and sent it to the Delco shop. They say that the ammeter is alright. We have tested all the wiring, had all the brushes sanded in. The armature is in good condition and tests alright. The coils are alright, as we have had them off and put in others in their place with the same results. All the connections have been taken off and replaced and we cannot locate anything wrong, nor does anything we do make any difference. We have had about a dozen fellows try their hands at it without the slightest result. We have changed batteries several times and know the connections are good.—E. R. Blair & Sons, Coleraine Tire & Battery Hospital, Coleraine, Minn.

Regardless of what you have to say



HUDSON MODEL 6-40 DELCO SYSTEM. MOTOR GENERATOR NO.66  
IGNITION COIL NO.2116 COMBINATION SWITCH NO.1055

Fig. 9



about the connections being tight and the switch in good condition, we can see no answer to the foregoing other than that there is a defective connection somewhere or that the fingers of the switch are not making good contact. We rather lean to the latter theory, for the reason that manipulating the switch establishes contact and the generator becomes operative. Refer to Fig. 13. Test can be made by cutting out the switch contacts, proceeding as follows:

In the first place, the switch contact between the generator positive brush and the shunt field winding should be cut out. These connect to terminals Nos. 6 and 9. Installing a jumper wire between these two terminals will have the effect of cutting out the switch in so far as the generator is concerned. If, with a jumper across these two points the generator delivers its current, the proof is conclusive that the trouble is in the switch contacts.

On the other hand the generator may be delivering current, but there may be a faulty contact between the generator positive brush and the terminals to which the battery wire is connected. Again referring to the diagram, it is quite apparent that if a jumper is installed between binding posts Nos. 1 and 6 on the switch the effect will be to cut out all of the switch mechanism, as well as the ammeter, and connect the generator directly to the battery. In both of the foregoing tests we recommend that an ammeter be inserted into the line between No. 1 binding and the battery, as it is quite possible that the car ammeter is at fault.

The foregoing instructions are given on the assumption that you are correct regarding the condition of the generator, commutator brushes and field windings.

#### INCREASING THE SIZE OF DODGE VALVES

Q—In installing larger valves (Hudson, for instance) in a Dodge engine, about how much can safely be reamed out of the valve seats?

2—What is the diameter of the Dodge valve?

3—What is the diameter of the Hudson valve?

4—Can lighter pistons be installed to advantage if the rings are lapped in? This engine has gone 18,000 miles and these rings were installed at 12,000 miles. The compression is good. Would it be advisable to leave the old pistons and rings in, as the compression is good and excessive speed is not desired?

5—If the Hudson valve is used and the stem is cut off approximately  $1\frac{1}{4}$  in. or enough to compress the valve spring that much above normal, would the spring be compressed too much for reasonable wear?

6—What other engines use valves about the width of Hudson and stem about the same size and length as Dodge?—Geo. H. Ribbing, Hiteman, Ia.

1—The Hudson valve you will have to use is that which was installed in the 1913, 37 and 45 models, the 1914 and 1915, 54 model, or the 17, 18 or 19 models. They range from 25-32 in. in diameter to 13-16 in. in diameter. As the Dodge valve is  $1\frac{11}{16}$  in. in diameter, it is plain to see that if the smaller Hudson valves are used,  $3/32$  of an inch must be removed from the port, and if the larger sizes are used,  $1/8$  in. must be removed. As the latter calls for a cut  $1/16$  in. deep all around, we should recommend its installation.

2 and 3—These are answered in the above.

4—Unless exceptional speed is desired we would recommend that you retain the old pistons and rings. According to your description, they seem to be in very good condition, and we believe you will do well to get their remaining service life out of them before installing the lighter pistons. Of course, the latter will give better engine speed and acceleration.

5—It will be impossible to cut the Hudson valve stem off as much as you suggest, for the reason that the difference between the Dodge stem, which is  $6\frac{17}{32}$  in. long, and the shorter Hudson stem, which is  $6\frac{11}{16}$  in. long, is only  $5/32$  in. Even on the longer Hudson valve, which is  $6\frac{7}{8}$  in. long, the difference is only  $11/32$  in. The correct way to arrive at the point on the valve stem at which the key must be placed is to compress the spring on a scale until it

registers 65 lbs. Measure its overall length and mark the valve stems accordingly. A compression of 1-1.4 in. beyond normal would be altogether too much, as we believe it would result in compressing the spring tightly.

6—The reply to this question will necessitate considerable research work which will result in an unavoidable delay.

#### WIRING DIAGRAM OF EMPIRE MODEL 45

Q—Publish wiring diagram of a 1916 four-cylinder Empire car, model 45.—Charles W. Gunnett, Leadwood, Mo.

The wiring diagram of the Empire, model 45, 1916, is shown in Fig. 10.

#### MAGNETO ON PACKARD SIX ENGINE

Q—We have a six-cylinder "T" head Packard engine on a deep well pump. The magneto was stolen and we would like to know the type and make of magneto this engine used.—L. I. Young, Hotel Bernardo, Ranger, Tex.

This engine used a "DU6" Bosch magneto. Viewed from the driving end, it is a clockwise magneto.

#### VALVE SPRING DATA

Q—Give the name of the company that manufactures valve springs for automobiles and motorcycles.

2—How stiff a spring would be necessary for a  $1\frac{1}{2}$  in. valve with a  $\frac{3}{4}$  in. lift? The spring is  $1\frac{3}{4}$  in. long.

1—This question will be answered by letter.

2—A minimum of 25 lbs., when spring is deflected  $\frac{1}{4}$  in.

### LEGAL ADVICE

#### COLLECTING BAD ACCOUNTS

Q—Will you advise us as to what we can do to collect bad accounts? We have one on which we would especially like your advice. We gave a certain person credit for gas, oil, storage, repairs and labor. This person paid a little on the account from time to time, but lately hasn't paid anything. A few weeks ago she sold the car and now, to all appearances, won't pay the balance of the bill.

What can we do to collect? We are subscribers to Motor Age, but can't find any case like ours in the back numbers. What is the law in Wisconsin in regard to this?—City Service Garage, Iron River, Wis.

When a good collector fails to secure payment of an account, payment may be enforced through a court action, providing the debtor has property of any kind which may be reached by execution.

Wisconsin has a garagekeepers' lien law giving a lien on repairs of cars or parts thereof. But the lien requires retaining possession of the property repaired. In your case, where you extend credit and do not retain possession of the property repaired for which materials are furnished, you have no advantage over any other creditor in securing your money. You can bring suit and get a judgment, then have an execution issued and levy on any property of the debtor which may not be exempt for his or her debts.

Some lawyers make a specialty of collecting bad accounts and get the money by various tricks, often of a disagreeable or uncountenanced nature. I can give none of them.

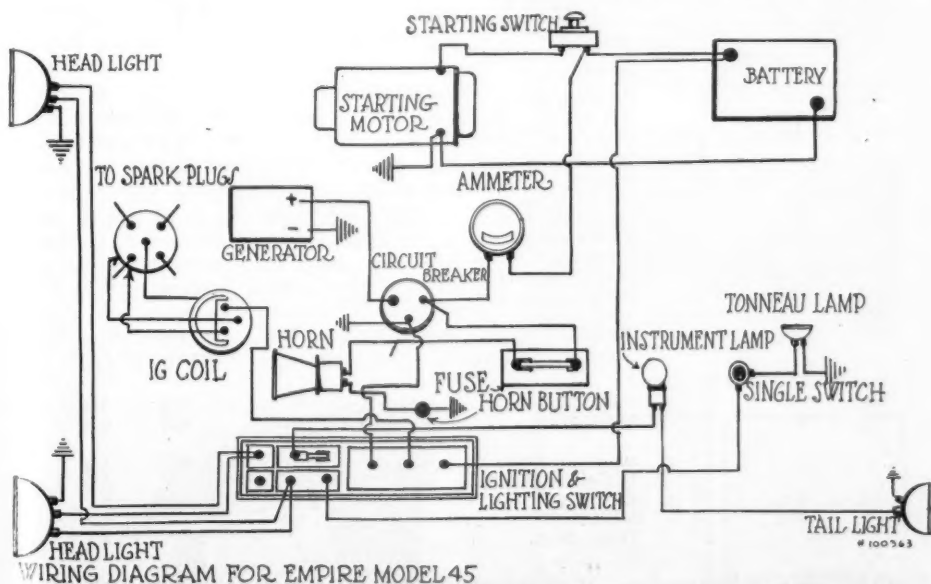


Fig. 10

# Cooling Water Capacities for 1920 and 1921 Cars

Motor Age Maintenance Data Sheet No. 122

NAME AND MODEL	In Gallons		NAME AND MODEL	In Gallons	
	1920	1921		1920	1921
Ace, AL.....	.....	7	Locomobile.....	8	.....
Allen, 43.....	6½	6½	Lorraine, 21T.....	.....	4
American, C.....	2½	6	Madison.....	.....	.....
American Beauty.....	.....	4¾	Maibohn, B.....	3½	5
Anderson, S40.....	4¾	4¾	Marmon, 34.....	5¼	5¼
Apperson, 821.....	9½	9	Maxwell, 25.....	3½	3½
Argonne.....	5	.....	McFarlan, 147.....	9	8
Auburn, 639.....	3¾	3½	Mercer, Series 5.....	7¼	7¼
Beggs, 20T & 21T.....	6½	5½	Meteor, R & RR.....	.....	5
Bell.....	.....	.....	Metz, M Six.....	3½	.....
Biddle.....	4½	.....	Mitchell.....	4¾	.....
Bour Davis.....	3¾	.....	Moon, 6-48.....	.....	5
Brewster.....	7	.....	Monroe, S-9-10.....	.....	3½
Briscoe, 434.....	4	4	Nash, 681.....	5	4¾
Buick.....	.....	5½	National, Sextett.....	6½	6½
Cadillac, 59.....	6	6	Nelson, E.....	3½	3
Cameron, 6-35.....	Air Cooled.		Noma, 1D.....	.....	4¼
Case.....	4½	.....	Norwalk, 430-KS.....	.....	6
Chalmers, 35 B & C.....	6½	8	Oakland, 34C.....	3	3
Champion.....	5	.....	Oldsmobile, 46.....	.....	5¼
Chandler.....	4	4	Olympian, 45.....	5	4¾
Chevrolet, 490.....	1¾	1¾	Overland, 4.....	3½	3¾
Chevrolet, FB.....	2½	2½	Owen Magnetic.....	6¼	.....
Cleveland 41.....	3	3	Packard, 335.....	8½	8½
Climber, 8.....	6	6	Paige, 642.....	.....	3
Cole, Aero 8.....	5¾	5¾	Paige, 6-66.....	.....	5¾
Columbia, Six.....	4	4½	Paterson, 6-50.....	3½	3½
Comet.....	5	.....	Peerless, 56-56.....	4½	8
Commonwealth.....	8	4	Phianna.....	.....	.....
Crawford, 21-6-40.....	3	3½	Piedmont, 6-40.....	3½	5
Crow Elkart.....	6	.....	Pierce Arrow, 38.....	6½	.....
Cunningham.....	9	.....	Pierce Arrow, 48.....	7½	.....
Daniels, D19.....	10	8½	Pan, A.....	.....	5
Davis.....	.....	.....	Pilot.....	5	.....
Dodge Bros.....	3½	2½	Porter, 46.....	8	9
Dort, 15.....	4¾	5	Premier.....	.....	7½
Dixie, HS-7000.....	5½	5	Ranger, B.....	.....	7½
Dorris, 680.....	4¾	4¾	Reo, T6.....	3¼	3¼
Dupont, A.....	.....	5	Revere, Series F.....	10	6
Elcar, D, H, G, K.....	5	4½	Roamer.....	6¼	.....
Elgin.....	4	.....	Rock Falls, 11.....	.....	8
Essex, A.....	6	6	R. & V. Knight, J.....	7¾	7¾
Ferris C21.....	.....	5½	R. & V. Knight, R.....	5½	5½
Franklin, 9B.....	Air Cooled.		Saxon, 125.....	.....	3¾
Ford, T.....	2½	3	Sayers Six, DP.....	4½	5
Gardner, G.....	.....	5	Scripps Booth.....	3	.....
Geronimo, 6E-45.....	5	5	Seneca, R, S & T21.....	4	3½
Grant.....	4¼	.....	Severin.....	.....	.....
Hanson 54-60.....	.....	4	Simplex.....	.....	.....
Hatfield, A-42.....	4¼	5	Singer.....	10½	.....
Haynes, L-Six.....	.....	5½	Skelton, 35.....	.....	8
Haynes, L-Twelve.....	7½	7½	Spocke, 21.....	Air Cooled	
H. C. S.....	.....	.....	Standard, I.....	7¾	7¾
Hollier.....	4½	.....	Stearns.....	6	.....
Holmes, 1921.....	Air Cooled.		Stevens Duryea, E.....	.....	5
Hudson, O.....	4¼	4¼	Stephens, 80.....	7	7½
Huffman, HS.....	.....	4	Studebaker.....	.....	.....
Hupmobile, R5.....	6	6	Studebaker.....	.....	.....
Jackson.....	.....	.....	Studebaker.....	.....	.....
Jones.....	6½	.....	Stutz.....	6½	.....
Jordan, M.....	.....	4¼	Templar.....	4½	.....
King.....	9	.....	Tulsa.....	.....	.....
Kissel.....	6¾	.....	Velie, 34.....	4½	4½
Kline Kar, S. K.....	8½	9	Velie, 48.....	4¾	4¾
La Fayette, 134.....	.....	6	Westcott, D38.....	5½	5¾
Leach.....	.....	7	Willys Knight, 20.....	.....	5½
Lexington, S.....	4¼	4¾	Winther, 61.....	.....	5
Liberty, 10C.....	6½	6½	Winton, 25.....	8	6
Lincoln.....	.....	.....	Wasp, 2011.....	.....	8

This data is reprinted from the Nov. 3, 1920, issue of Motor Age. It represents the latest complete information to date and will serve the majority of references made to it. Later complete data will be available as soon as the manufacturers are able to report on the 1922 models.



# The ACCESSORY SHOW CASE

## New Sources of Retail Profit

### DIRECT SIGHT GASOLINE GAGE

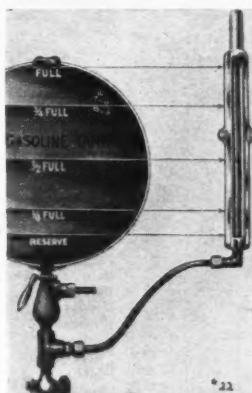
The Direct Sight Gasoline Gage works on the principle of the water level gage and has no working parts to get out of order. There are no floats, reciprocating parts, or holes to bore. The gage comes in a compact carton containing wood screws and directions for installing. The price is \$2. Manufactured by the Vulcan Engineering Co., Jackson, Mich.



Monarch draft brake for Fords

### MONARCH DRAFT BRAKE FOR FORDS

This is a device for closing the slot in the floor of the car used for the emergency brake lever. It is made of pressed steel and finished in black enamel. It slides smoothly back and forth as the handle is moved, and lies flat on the floor. It can be installed in a few minutes by simply slipping it over the lever and attaching it in place with four screws. Price \$1. Monarch Metal Products Co., St. Louis.



Direct sight gasoline gage

### LAZEAR LOCK WHEEL FOR FORDS

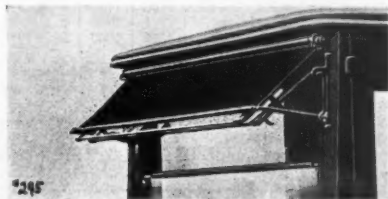
The Lazear wheel is of the type which when locked against theft spins freely on the steering post. The entire locking mechanism of this wheel is contained within the spider and is protected by a wall of hardened steel around which the aluminum spider is die cast. Two knobs are used to lock the device. By pulling down and pushing back these thumb knobs, the steel clutches are drawn back and the locking bolt allowed to slide into position. Price \$15. Lazear Products Co., 557 West Quincy st., Chicago.



Lazear lock wheel for Fords

### GOSLO AUTOMATIC SAFETY SIGNAL

The GoSlo signal is designed to flash a warning to the car behind every time the brake pedal is depressed. The signal is brilliant, due to the 21-c.p. bulb and a polished silver reflector, making it effective in broad daylight. The glass is black enamel except over the raised letters, which show red when the brake is applied. A feature of this signal is the method of holding the glass lens. A spring ring is used which cushions the lens while holding it firm and preventing rattle. Price \$5.50. GoSlo Safety Signal Co., 1243 West Third st., Cleveland.



Lane visor

### DENONCO NON-CHATTER BANDS FOR FORDS

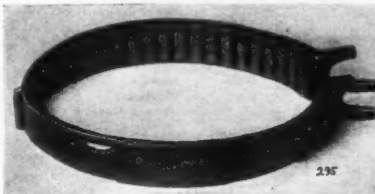
For the construction and principle of these bands, it is claimed that all chatter is eliminated. The hinge at the bottom, it is stated, keeps the band clear of the drum while in motion and allows the band to grip the drum gradually and firmly by contracting in the form of a true circle. Russel Mfg. Co., Middleton, Conn.

### LANE VISOR

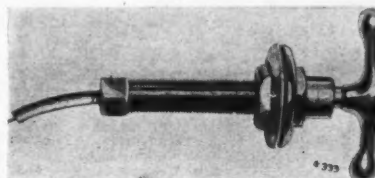
The Lane visor rolls up similar to a window shade, when not needed. On open cars it attaches directly to the stanchions of the windshield. On enclosed cars it is attached as shown in the illustration and is adjustable at any height. The Lane visor can be attached to any car, excepting Ford open cars. A special type is made for Ford sedans and coupes. Monarch Metal Products Co., St. Louis, Mo.

### COOPER DASH CONTROL

This is a means of controlling from the dash any of the various valves, ventilators and similar connections on the average automobile. It can be locked in any position by a slight twist to the right, and can be installed by boring a 1/2-in. hole. It is made from solid brass and finished steel. Price \$2.50. Cooper Mfg. Co., Marshalltown, Ia.



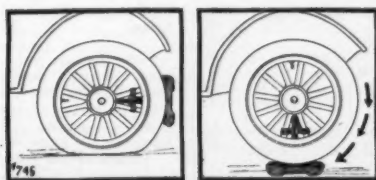
Denonco non-chatter bands for Fords



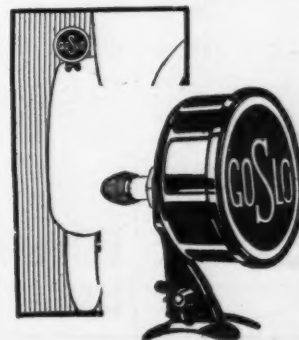
Cooper dash control

### LUCKY JACK FOR FORDS

The illustration shows clearly the principle of this jack. It also has the added features of being a lock and a mud hook. It is attached to the wheel opposite the valve stem, and is then securely clamped by means of the wing nut. Driving the car a few feet forward raises the wheel from the ground. Price \$2.50. Lucky Jack Co., Grand Junction, Ia.



Lucky jack for Fords



GoSlo automatic safety traffic signal

## Specifications of Current Passenger Car Models

NAME AND MODEL	Engine Make	Cylinders, Bore and Stroke	WB	Tires	2-Pass.	5-Pass.	7-Pass.	Coupe	Sedan	NAME AND MODEL	Engine Make	Cylinders, Bore and Stroke	WB	Tires	2-Pass.	5-Pass.	7-Pass.	Coupe	Sedan
Ambassador.....R	Cont.	6-3 1/2 x 5 1/4	130	33x5	14500	14500	14500	14500	14500	Maxwell.....25	Own.	4-3 1/2 x 4 1/2	109	31x4	\$ 885	\$ 885	11385	11485	
American.....C	H-S.	6-3 1/2 x 5	127	32x4	2195	2195	2195	2195	2195	McFarlan.....1921	Own.	6-4 1/2 x 6	140	33x5	6300	6300	6300	6300	6300
Anderson.....Series 40	Cont.	6-3 1/2 x 4 1/2	120	33x4	2195	1650	1795	2550	2550	Mercer.....Series 5	Own.	4-3 1/2 x 4 1/2	132	32x4 1/2	3950	3950	3950	4850	5250
Apperson.....8-21-S	Own.	8-3 1/2 x 5	130	34x4 1/2	3000	3000	3250	4500	4500	Merit.....	Cont.	6-3 1/2 x 4 1/2	119	32x4	1985	1985	1985	1985	1985
Apperson.....Anniversary	Own.	8-3 1/2 x 5	130	34x4 1/2	3500	3500	3750	4500	4500	Meteor.....R & RR	Dues.	4-4 1/2 x 6	129	32x4 1/2	5500	5500	5500	5500	5500
Auburn.....6-51	Cont.	6-3 1/2 x 4 1/2	121	32x4	1670	1605	1760	2475	2495	Metz.....M6	Rut.	6-3 1/2 x 5	120	32x4	1905	1905	2795	2895	
Beggs.....20T	Cont.	6-3 1/2 x 4 1/2	120	33x4	1775	1520	2320	2420	2420	Mitchell.....F-50	Own.	6-3 1/2 x 5	120	32x4	1790	1790	1790	1790	1790
Bell.....4-32	H-S.	4-3 1/2 x 5	114	31x4	1495	1495	1495	1495	1495	Mitchell.....F-50	Own.	6-3 1/2 x 5	120	33x4	11400	11400	11400	11400	11400
Bell.....6-50	H-S.	6-3 1/2 x 5	124	32x4	1695	1695	1695	1695	1695	Mitchell.....F-50	Own.	6-3 1/2 x 5	127	33x4	1795	1795	1795	1795	1795
Biddle.....B1 & B5	Buda.	4-3 1/2 x 5 1/2	121	32x4	3475	3475	4350	4350	4350	Mitchell.....F-50	Own.	6-3 1/2 x 5	120	33x4	1795	1795	1795	1795	1795
Birch Super-Four.....	H-S.	4-3 1/2 x 5	117	33x4	1195	1195	1195	1195	1195	Monroe.....S-9 & 10	Own.	4-3 1/2 x 4 1/2	115	32x3 1/2	1295	1295	1295	1295	1295
Birch Light Four.....	LeR.	4-3 1/2 x 4 1/2	108	30x3 1/2	995	995	995	995	995	Monroe.....S-11 & 12	Own.	4-3 1/2 x 4 1/2	115	33x4	1785	1785	2285	2785	2785
Birch Light Six.....	H-S.	4-3 1/2 x 5	117	33x4	1395	1395	1445	1995	1995	Moon.....6-48	Cont.	6-3 1/2 x 4 1/2	122	32x4	1785	1785	2285	2785	2785
Bour-Davis.....21S	Cont.	6-3 1/2 x 5 1/4	126	33x4 1/2	2385	2385	2385	2385	2385	Moon.....6-68	Cont.	6-3 1/2 x 5 1/4	125	32x4 1/2	2285	2285	2285	2285	2285
Brewster.....91	Own.	4-4 x 5 1/2	125	32x4 1/2	7000	7000	7000	7000	7000	Murray-Mac Six.....	Own.	6-3 1/2 x 5 1/4	128	34x4 1/2	4250	4250	4250	4250	4250
Briscoe, 4-34.....	Own.	4-3 1/2 x 5	109	31x4	1085	1085	1085	1085	1085	Nash.....681-7	Own.	6-3 1/2 x 5	121	33x4	1525	1545	1695	2395	2695
Buick.....1922-34-35-36-37	Own.	4-3 1/2 x 5	109	31x4	935	975	1475	1650	1650	Nash.....682	Own.	6-3 1/2 x 5	127	34x4 1/2	1695	1695	1695	1695	1695
Buick.....1922-44-5-6-7	Own.	6-3 1/2 x 5	118	33x4 1/2	1495	1525	2135	2435	2435	Nash Four.....41-4	Own.	4-3 1/2 x 5	112	33x4	1025	1045	1645	1835	
Buick.....1922-48-9-50	Own.	6-3 1/2 x 5	124	34x4 1/2	1735	2325	2635	2635	2635	National Sextet.....BB	Own.	6-3 1/2 x 5 1/4	130	32x4 1/2	2990	2990	2990	4140	4240
Bush.....E.C.4	Lye.	4-3 1/2 x 5	116	33x4	1195	1195	1195	1195	1195	Noma.....1C	Cont.	6-3 1/2 x 4 1/2	128	32x4 1/2	2800	2850	3200	3700	
Bush.....E.C.6	Rut.	6-3 1/2 x 5	116	33x4	1345	1345	1750	1850	1850	Norwalk.....430-KS	Lye.	4-3 1/2 x 5	116	32x3 1/2	1035	1035	1035	1035	1035
Cadillac.....61	Own.	8-3 1/2 x 5 1/4	132	33x5	3790	3790	3940	4690	4950	Oakland.....34-D	Own.	6-2 1/2 x 4 1/2	115	32x4	1095	1145	1265	1625	1725
Case.....V	Own.	6-3 1/2 x 5 1/4	126	34x4 1/2	1935	1935	1935	1935	1935	Ogren.....6-T	Cont.	6-3 1/2 x 5 1/4	134	33x5	14250	4250	4375	5200	5500
Chalmers.....6-30	Own.	6-3 1/2 x 4 1/2	112	32x4	1245	1295	1395	1995	2295	Oldsmobile.....43-A	Own.	4-3 1/2 x 5 1/4	115	32x4	1145	1145	1645	1845	
Chalmers.....6-30	Own.	6-3 1/2 x 4 1/2	122	33x4 1/2	995	995	995	995	995	Oldsmobile.....37-A	Own.	6-2 1/2 x 4 1/2	112	32x4	1450	1450	2145	2145	
Champion.....Tourist	Lye.	4-3 1/2 x 5	118	32x4	1195	1195	1195	1195	1195	Oldsmobile.....46	Own.	8-2 1/2 x 4 1/2	122	33x4 1/2	1735	1735	2635	2635	
Champion.....Special	H-S.	4-3 1/2 x 5	118	32x4	1195	1195	1195	1195	1195	Oldsmobile.....47	Own.	8-2 1/2 x 4 1/2	115	32x4	1625	1625	2185	2425	
Chandler.....Six	Own.	6-3 1/2 x 5	123	33x4	1785	1785	2785	2885	2885	Overland.....4	Own.	4-3 1/2 x 4	100	30x3 1/2	595	595	850	895	
Chevrolet.....490	Own.	4-3 1/2 x 4	102	30x3 1/2	525	525	875	875	875	Packard.....Single-Six	Own.	6-3 1/2 x 4 1/2	116	33x4 1/2	2350	2350	3125	3350	
Chevrolet.....FB	Own.	4-3 1/2 x 4	110	32x4	975	975	1575	1575	1575	Packard.....Twin Six	Own.	12-3 x 5	136	35x5	4850	4850	6600	6800	
Chevrolet.....40	Own.	6-3 x 4 1/2	112	32x4	1295	1295	2195	2295	2295	Paige.....6-44	Own.	6-3 1/2 x 5	119	32x4	1635	1635	2450	2570	
Climber Four.....K	H-S.	4-3 1/2 x 5	115	33x4	1385	1385	1385	1385	1385	Paige.....6-66	Cont.	6-3 1/2 x 5	131	33x4	12975	13295	2875	3755	3830
Climber Six.....S	North.	8-3 1/2 x 4 1/2	127 1/2	33x5	2485	2485	3885	3685	3685	Paige.....6-55	H-S.	6-3 1/2 x 5	121	33x4	2000	2000	2100	2100	
Cole.....870	Rut.	6-3 1/2 x 5	115	32x4	1195	1195	1195	1195	1195	Paternon.....650	Cont.	6-3 1/2 x 4 1/2	120	33x4	1595	1625	2695	2695	
Columbia Challenger.....	Cont.	6-3 1/2 x 5 1/4	125	33x4 1/2	2350	2450	3650	3650	3650	Peerless.....56-S-7	Own.	8-3 1/2 x 5	125	34x4 1/2	2880	2880	3500	3790	
Columbia.....D-C&CS	Cont.	6-3 1/2 x 5 1/4	125	33x4 1/2	2350	2450	3650	3650	3650	Piedmont.....4-30	Lye.	4-3 1/2 x 5	116	32x3 1/2	970	970	970	970	
Comet.....C-53	Cont.	4-3 1/2 x 5	117	32x4	1395	1395	2465	2465	2465	Piedmont.....6-40	Cont.	6-3 1/2 x 4 1/2	122	32x4	1285	1285	1285	1285	
Commonwealth.....44	H-S.	4-3 1/2 x 5	117	32x4	1395	1395	2465	2465	2465	Pierce-Arrow.....	Own.	6-4 x 5 1/2	138	33x5	7000	6500	8000	8500	
Crawford.....22-6-40	Cont.	6-3 1/2 x 5 1/4	122 1/2	32x4	3000	3000	3000	3000	3000	Pilot.....6-45	Teetor	6-3 1/2 x 5	120	32x4	1945	1895	1895	1895	
Crow-Elkhart.....163-65	Lye.	4-3 1/2 x 5	117	32x3 1/2	1295	1295	1295	1295	1295	Pilot.....6-50	H-S.	6-3 1/2 x 5	126	32x4 1/2	2285	2285	2335	3350	3400
Crow-Elkhart.....S63-65	Lye.	6-3 1/2 x 5	117	33x4	1545	1545	1545	1545	1545	Porter.....46	Own.	4-4 x 6 1/2	142	35x5	6750	6750	6750	7800	
Daniels.....D-19	Own.	8-3 1/2 x 5 1/4	132	34x4 1/2	5350	5350	5350	6250	6950	Premier.....6-D	Own.	6-3 1/2 x 5 1/4	126 1/2	33x5	3790	3690	3890	4690	5190
Davis.....61-67	Cont.	6-3 1/2 x 4 1/2	120	33x4 1/2	1895	1795	2050	2595	2595	Premocor.....6-40 A	Falls.	6-3 1/2 x 4 1/2	117	32x4	1295	1295	1945	1945	
Dixie Flyer.....H-S-70	H-S.	4-3 1/2 x 5	112	32x4	1195	1195	1395	1895	1895	Raleigh.....A-6-60	H-S.	6-3 1/2 x 5	122	32x4 1/2	2250	2250	3100	3200	
Dodge Brothers.....	Own.	4-3 1/2 x 4 1/2	114	32x4	935	985	1585	1785	1785	R & V Knight.....J	Own.	4-3 1/2 x 5	116	32x4	1850	1850	2650	2750	
Dorris.....6-80	Own.	4-3 1/2 x 5	132	33x5	14785	4785	5800	7190	7190	R & V Knight.....J	Own.	6-3 1/2 x 5 1/4	127	32x4 1/2	3350	3350	4000	4200	
Dort.....19-14	D-Ly.	4-3 1/2 x 5	108	31x4	985	985	1535	1685	1685	Reo Series.....B, T & U	Own.	6-3 1/2 x 5	120	33x4	1650	1650	1650	1650	
Driggs.....	Own.	4-2 1/2 x 4 1/2	101	30x3 1/2	1275	1275	1975	1975	1975	ReVerre.....C	Dues.	4-4 1/2 x 6	131	32x4 1/2	4850	4650	4650	6500	
Du Pont.....A	Own.	4-3 1/2 x 5 1/4	124	32x4 1/2	3400	3400	4500	4900	4900	Roamer.....6-54-E	Cont.	6-3 1/2 x 5 1/4	128	32x4 1/2	2750	2750	3950	3950	
Durant.....A-22	Own.	4-3 1/2 x 5 1/4	109	31x4	890	890	1365	1365	1365	Rolls-Royce.....	U. S. Chassis	4-4 1/2 x 6	143 1/2	33x5	3850	3650	11750	14750	
Earl.....40	Own.	4-3 1/2 x 5 1/4	112	32x4	1375	1285	1145	1995	1995	Romer.....	Cont.	6-3 1/2 x 4 1/2	120	33x4	1975	1975	2050	2400	2700
Elcar.....K-4	Lye.	4-3 1/2 x 5	117	33x4	1145	1145	1545	1645	1645	Saxon.....125	Own.	4-3 1/2 x 5	112	32x4	1295	1295	1995	1995	
Elcar.....7-R	Cont.	6-3 1/2 x 4 1/2	117	33x4	1595	1595	1595	2495	2495	Sayers Six.....DP	Cont.	6-3 1/2 x 4	118	33x4	1745	1745	2995	2995	
Elgin.....K-1	Falls.	6-3 1/2 x 4 1/2	118	33x4	1595	1595	2395	2395	2395	Seneca.....L & O	LeR.	4-3 1/2 x 4 1/2	108	30x3 1/2	1045	1045	1045	1045	
Essex.....	Own.	4-3 1/2 x 5	108 1/2	32x4	1195	1195	1495	1995	1995	Severin.....Six	Cont.	6-3 1/2 x 5 1/4	122 1/2	33x4 1/2	1485	1485	2100	2250	
Falcon.....4	Own.	4-3 1/2 x 5	115	32x4	1295	1295	1990	2035	2035	Severin.....Six	Cont.	6-3 1/2 x 5 1/4	122 1/2	33x5	2550	2550	3250	3350	
Falcon.....6	Own.	6-3 1/2 x 5	115	32x4	1595	1595	2295	2935	2935	Southern Six.....660-2	H-S.	6-3 1/2 x 5	127	32x4 1/2	2375	2375	2395	2395	
Fergus.....S-S-21	Own.	6-3 1/2 x 5	126	33x4 1/2	Chassis Price	10000	3895	3895	3895	Sperling, A.....	Supr.	4-3 1/2 x 5	114	32x4	980	980	1685	1685	
Ferris.....Series 60	Cont.	6-3 1/2 x 5 1/4	130	32x4 1/2	2695	2695	2795	3895	3895	Standard.....J	Own.	8-3 1/2 x 5	127	34x4 1/2	3400	3400	4500	4800	
Ferris.....Series 70	Cont.	6-3 1/2 x 5 1/4	130	32x4 1/2	2895	2895	699	699	699	Stanley Steamer.....	Own.	2-4 x 5	130	34x4 1/2	2600	2600	2600	3775	3850
Ford.....T	Own.	4-3 1/2 x 4	109	30x3 1/2	325	1355	595	699	699	Stearns.....SKL4	Own.	6-3 1/2 x 4 1/2	125	34x4 1/					



## Specifications of Current Motor Truck Models

NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES		Final Drive	NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES		Final Drive	NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES		Final Drive
				Front	Rear						Front	Rear						Front	Rear	
Acason	1 3/4	\$1650	3 1/2 x 5	34x5 1/2	34x5 1/2	W	Corbitt, H	1 3/4	\$1800	3 1/2 x 5	35x5 1/2	35x5 1/2	B	Garford, 77D	3 1/2	\$4300	4 1/2 x 6	36x5	36x6d	W
Acason, R	1 1/2	2260	3 1/2 x 5 1/4	36x3 1/2	36x5	W	Corbitt, E	1 1/2	2200	3 1/2 x 5	34x3 1/2	34x4	W	Garford, 68D	5	5200	5 x 6 1/2	36x6	40x6d	W
Acason, RB	1 1/2	2485	3 1/2 x 5 1/4	36x3 1/2	36x6	W	Corbitt, D	1 1/2	2600	3 1/2 x 5	36x3 1/2	36x5	W	Garford, 150-A	7 1/2	5500	5x6 1/2	36x6	40x7d	C
Acason, H	2 1/2	3205	4 1/2 x 5 1/4	36x4	36x8*	W	Corbitt, C	2	3150	4 1/2 x 5 1/4	36x3 1/2	36x7	W	Gary, F	1	2100	3 1/2 x 5	36x3 1/2	36x4	W
Acason, L	3 1/2	4295	5 x 6 1/4	36x5*	36x10*	W	Corbitt, B	2 1/2	3300	4 1/2 x 5 1/4	36x4	36x7	W	Gary, I	1 1/2	2550	4 x 5 1/2	36x3 1/2	36x5	W
Acason, M	5	5250	5 x 6 1/2	36x6	40x12	W	Corbitt, A	3 1/2	4100	4 1/2 x 5 1/2	36x5	36x10	W	Gary, J	2 1/2	3150	4 1/2 x 5 1/2	36x4	36x7	W
Ace, C	1 1/2	2295	3 1/2 x 5 1/2	34x3 1/2	34x5*	W	Corbitt, AA	5	5000	4 1/2 x 6	36x6	40x6d	W	Gary, K	3 1/2	4050	4 1/2 x 6	36x5	40x5d	W
Ace, A	2 1/2	2705	4 1/2 x 5 1/2	36x4*	36x7	W	Day-Elder, A	1	1600	3 1/2 x 5	34x3 1/2	34x4	W	Gary, M	5	5150	5 x 6 1/2	36x6	40x6d	W
Acme, G	1 1/2	.....	3 1/2 x 5	35x5 1/2	35x5 1/2	W	Day-Elder, B	1 1/2	2000	3 1/2 x 5	34x3 1/2	34x5	W	Gersix, M	1 1/2	3100	4 x 5 1/2	36x3 1/2	36x7	W
Acme, B	1 1/2	.....	3 1/2 x 5	34x3 1/2	34x5	W	Day-Elder, D	2	2400	4 1/2 x 5 1/2	36x4	36x7	W	Gersix	2 1/2	3500	4 1/2 x 5 1/2	36x4	36x8	W
Acme, F	1 1/2	.....	3 1/2 x 5	36x4	36x7*	W	Day-Elder, C	2 1/2	2750	4 1/2 x 5 1/2	36x4	36x7	W	Gersix	3 1/2	4500	4 1/2 x 6	36x5	40x12	W
Acme, AC	2 1/2	.....	4 1/2 x 5 1/2	36x4	36x7*	W	Day-Elder, F	3 1/2	3150	4 1/2 x 5 1/2	36x5	36x5d	W	Golden West, GH	3	4500	4 1/2 x 6	36x7	36x7	W
Acme, C	3 1/2	.....	4 1/2 x 5 1/2	36x5	40x10	W	Day-Elder, E	5	4250	4 1/2 x 6	36x5*	40x6d*	W	Golden West, G	3 1/2	5000	4 1/2 x 6 1/2	36x6	36x6	W
Acme, E	5	.....	4 1/2 x 6	36x6	40x12	W	Dearborn, E	1	1700	3 1/2 x 5 1/4	35x5 1/2	35x5 1/2	W	Graham Bros. A	1 1/2	2495	3 1/2 x 5	35x5 1/2	36x6 1/2	I
Akr'n Multi-Trk-20	1 1/2	1605	4 x 5 1/4	34x5	34x5	B	Dearborn, FX	1 1/2	2300	3 1/2 x 5 1/4	34x4	34x5	W	Gramm-Bern, 10	1	1365	3 1/2 x 5	33x5 1/2	33x5 1/2	F
American, 25	2 1/2	3350	4 x 6	36x4*	36x4d*	W	Dearborn, F	1 1/2	2180	3 1/2 x 5 1/4	34x4*	34x5*	W	Gramm-Bern, 15	1 1/2	2050	3 1/2 x 5	36x3 1/2	36x5*	I
American, 40	4	4275	4 1/2 x 6	36x5*	36x5d*	W	Dearborn, 48	2	2590	3 1/2 x 5 1/4	34x4*	34x5*	W	Gramm-Bern, 65	1 1/2	2725	3 1/2 x 5	36x3 1/2	36x5	W
Apex, G	1 1/2	1150 1/2	3 1/2 x 5	33x5 1/2	33x5 1/2	I	Defiance, G	1	1995	3 1/2 x 5	35x5 1/2	35x5 1/2	I	Gramm-Bern, 20	2	3175	4 1/2 x 5 1/2	36x4*	36x7*	W
Apex, D	1 1/2	1915	3 1/2 x 5 1/2	34x3 1/2	34x4	I	Defiance, E	1 1/2	2095	3 1/2 x 5	35x5 1/2	35x5 1/2	I	Gramm-Bern, 25	2 1/2	3575	4 1/2 x 5 1/2	36x4*	36x4d*	W
Apex, F	2 1/2	2095	4 1/2 x 5 1/2	36x4	36x7	I	Defiance, F	1 1/2	2275	3 1/2 x 5	35x5 1/2	35x5 1/2	I	Gramm-Bern, 35	3 1/2	4375	4 1/2 x 5 1/2	36x5	40x5d*	W
Apex, E	3 1/2	3975	4 1/2 x 6	36x5	36x10	I	DeMartini, 1 1/2	1 1/2	2600	3 1/2 x 5	34x3 1/2	34x7	W	Gramm-Bern, 50	5	5275	4 1/2 x 6	36x6	40x6d*	W
Armleder, 20	1	.....	3 1/2 x 5 1/4	34x3 1/2	34x5*	W	DeMartini, 2	2	3300	4 x 6 1/2	36x3 1/2	36x7	W	Hahn, J4	1	.....	3 1/2 x 5	34x5*	34x5*	W
Armleder, HW	2 1/2	.....	4 1/2 x 5 1/2	36x4*	36x7*	W	DeMartini, 3	3	4250	4 1/2 x 6	36x4	36x10	W	Hahn, CD	1 1/2	.....	4 1/2 x 5 1/2	36x3 1/2	36x6*	W
Armleder, KW	3 1/2	.....	4 1/2 x 5 1/2	36x5	36x5d	W	DeMartini, 4	4	4800	4 1/2 x 6	36x5	36x12	W	Hahn, EE	2 1/2	.....	4 1/2 x 5 1/2	36x4*	36x8*	W
Atco, B	1 1/2	.....	3 1/2 x 5	34x3 1/2	36x6	W	Denby, 31	3 1/2	1625	3 1/2 x 5	35x5	35x5	W	Hahn, F	3 1/2	.....	4 1/2 x 5 1/2	36x5*	36x10*	W
Atco, B1	1 1/2	.....	3 1/2 x 5 1/4	34x5 1/2	36x6 1/2	I	Denby, 33	1 1/2	2300	3 1/2 x 5	35x5 1/2	36x7 1/2	I	Hahn, EF	5	.....	4 1/2 x 6	36x6	40x12	W
Atco, A	2 1/2	.....	4 1/2 x 5 1/2	36x4*	36x8*	W	Denby, 34	2	2600	3 1/2 x 5	36x3 1/2	36x6	I	Hal-Fur, E	1 1/2	2350	4 x 5 1/2	34x5 1/2	38x7 1/2	W
Atlas, M.D.	1	1185	3 1/2 x 5	32x4 1/2	32x4 1/2	W	Denby, 25	3	3300	4 1/2 x 5 1/4	36x4	36x7	I	Hal-Fur, B	2 1/2	3000	4 1/2 x 5 1/2	35x5*	38x7*	W
Atterbury, 20R	1 1/2	2475	3 1/2 x 5	34x3 1/2	34x5	W	Denby, 27	4	4200	4 1/2 x 5 1/2	36x5	36x5d	I	Hal-Fur, F	3 1/2	4000	4 1/2 x 5 1/2	36x6 1/2	40x10 1/2	W
Atterbury, 7CX	2 1/2	3175	4 1/2 x 5 1/2	36x4	36x4d	W	Denby, 210	5	4850	4 1/2 x 5 1/2	36x6	40x6d	W	Hall, 1 1/2	1 1/2	3100	3 1/2 x 5	34x5 1/2	38x7 1/2	W
Atterbury, 7D	2 1/2	3975	4 1/2 x 5 1/2	36x5	40x5d	W	Dependable, A	1 1/2	1650	3 1/2 x 5	34x5	36x6	W	Hall, 2 1/2	2 1/2	3275	4 1/2 x 5 1/2	36x4	36x6	W
Atterbury, 8E	3 1/2	4975	4 1/2 x 6	36x5	40x6d	W	Dependable, D	2 1/2	2350	3 1/2 x 5 1/2	34x3 1/2	34x5	W	Hall, 3 1/2	3 1/2	4100	4 1/2 x 5 1/2	36x5	36x5d	W
Autocar, 21UF	1 1/2-2	2300	4 1/2 x 5 1/2	34x4*	34x5*	D	Dependable, E	3 1/2	2650	4 x 6 1/2	35x5	36x6	W	Hall, 5	5	5100	4 1/2 x 5 1/2	36x5	40x6d	W
Autocar, 21UG	1 1/2-2	2400	4 1/2 x 5 1/2	34x4*	34x5*	D	Dependable, G	3 1/2	2950	4 1/2 x 5 1/2	36x4	36x7	W	Hall, 7 chain	7	5100	4 1/2 x 5 1/2	36x5	40x6d	C
Autocar, 26Y	.....	4350	4 1/2 x 5 1/2	34x6	36x12	D	Dependable, H	3 1/2	3550	4 1/2 x 6	36x6	38x7	W	Harvey, WEA	1 1/2	2550	4 1/2 x 5 1/2	34x3 1/2	34x5	W
Autocar, 26-B	.....	4500	4 1/2 x 5 1/2	34x6	36x12	D	Diamond, T, O	1-1 1/2	1975	3 1/2 x 5 1/2	36x3 1/2	36x4*	W	Harvey, WOA	2	2950	4 1/2 x 5 1/2	34x4	34x7	W
Available, H1 1/2	1 1/2	2175	4 x 5 1/2	36x3 1/2	36x5*	W	Diamond, T, FS	1 1/2	2250	3 1/2 x 5 1/2	36x3 1/2	36x5	W	Harvey, WFA	2 1/2	3300	4 1/2 x 5 1/2	36x4	36x7	W
Available, H2	2	2775	4 x 5 1/2	36x3 1/2	36x6*	W	Diamond, T, T	2	2650	4 x 5 1/2	36x4	36x7	W	Harvey, WHA	3 1/2	3950	4 1/2 x 6	36x5	36x5d	W
Available, H2 1/2	2 1/2	3475	4 x 5 1/2	36x4*	36x8*	W	Diamond, T, U	3 1/2	3750	4 1/2 x 5 1/2	36x5	36x5d	W	Harvey, WKA	5	4500	4 1/2 x 6	36x6	40x6d	W
Available, H3 1/2	3 1/2	4475	4 1/2 x 5 1/2	36x5	40x5d	W	Diamond, T, EL	5	4325	4 1/2 x 5 1/2	36x6	40x6d	W	Hawkeye, K	1 1/2	1850	3 1/2 x 5 1/4	34x3 1/2	34x5*	I
Available, H5	5	5375	4 1/2 x 6	36x6	40x12	W	Diamond, T, S	5	4500	4 1/2 x 6	36x6	40x6d	W	Hawkeye, M	2	2650	4 1/2 x 5 1/2	36x4*	36x6*	I
Available, H7	7	6000	5 x 6	36x6	40x14	B	Diels, A	1	.....	3 1/2 x 5	34x4 1/2	35x5	I	Hawkeye, N	3 1/2	3700	4 1/2 x 6	36x5*	36x10*	I
Avery	1	.....	3 x 4	34x5 1/2	34x5 1/2	I	Dispatch, F	1 1/2	1350	3 1/2 x 5	36x6	36x6	I	Hendrickson, N	2 1/2	3150	4 1/2 x 5 1/2	36x4*	36x7*	W
Beck, A Jr.	1	1950	3 1/2 x 5	34x3 1/2	34x4	I	Doane	2 1/2	4100 1/2	4 1/2 x 5 1/2	36x5	36x7	C	Huffman, B	1 1/2	1995	3 1/2 x 5	34x3 1/2	34x6	W
Beck, C	2	2550	4 1/2 x 5 1/2	36x4	36x6	W	Doane	3 1/2	5100 1/2	4 1/2 x 5 1/2	36x5	36x5d	C	Huffman, C	1 1/2	1795	3 1/2 x 5	34x3 1/2	34x6	I
Bell, M	1	1495	3 1/2 x 5 1/4	35x5	35x5 1/2	W	Dodge Brothers	6	6000 1/2	5 x 6 1/2	36x4	40x6d	C	Hurlburt A	1 1/2	2850	4 x 5 1/2	34x4	34x5	W
Bell, E	1 1/2	2100	3 1/2 x 5 1/4	34x3 1/2	34x5	W	Dorris, K-4	2-2 1/2	885	3 1/2 x 5 1/2	32x4 1/2	32x4 1/2	C	Hurlburt B	2 1/2	3750	4 1/2 x 5 1/2	36x4	36x4d	W
Bell, O	2 1/2	2550	4 1/2 x 5 1/2	34x4	34x6	W	Dorris, K-7	3 1/2	3400	4 1/2 x 5 1/2	36x4	36x7	W	Hurlburt C	3 1/2	4590	4 1/2 x 6	36x5	36x5d	W
Belmont, D	2	2675	3 1/2 x 5	34x3 1/2	34x6*	D	Dort, 103	1 1/2	685	3 1/2 x 5	31x4	31x4	B	Hurlburt D	5	5500	4 1/2 x 6	36x5	40x6d	W
Belmont, F	3 1/2	3525	4 x 6	36x5*	36x5d*	D	Double Drive B	3	4000	4 1/2 x 5 1/2	6	6	W	Indep't (Iowa), B	1	1665	3 1/2 x 5	34x3 1/2	34x4	I
Bessemer, G	1 1/2	1395	3 1/2 x 5	35x5 1/2	35x5 1/2	I	Douglas G	1 1/2	1850	3 1/2 x 5 1/2	36x5	37x8*	W	Indep't (Iowa), C	1 1/2	2040	3 1/2 x 5 1/2	34x3 1/2	34x5	W
Bessemer, H-2	1 1/2	1995	3 1/2 x 5	36x3 1/2	36x5	I	Douglas I	3	2950	4 1/2 x 5 1/2	36x6	37x8*	W	Indep't (Ia.), H, I	2 1/2	2940	4 1/2 x 5 1/2	34x4	34x6	I
Bessemer, J-2	2 1/2	2595	4 1/2 x 5 1/2	36x4	36x4d	I	Duplex, A	1 1/2	2775	4 x 5 1/2	35x5 1/2	35x7 1/2	W	Indep't (Ohio), F	1 1/2	2385	3 1/2 x 5	36x3 1/2	36x5	W
Besmer, K-2	4	3495	4 1/2 x 5 1/2	36x5	36x10	I	Duplex, E	3 1/2	4250	4 1/2 x 5 1/2	36x8	36x8	I	Indep't (Ohio), H	2 1/2	3085	4 1/2 x 5 1/2	36x4	36x4d	W
Big 4, H	3 1/2-4	8000	4 1/2 x 5 1/2	36x6	36x6	W	Duty, 21	2	1490	3 1/2 x 5	34x3 1/2	34x5	I	Indep't (Ohio), K	3 1/2	3985	4 1/2 x 5 1/2	36x5	36x5d	W
Big 4, T	7	5500	4 1/2 x 6	36x6	36x6	W	Eagle, 100-2	2	2275	3 1/2 x 5 1										

## Specifications of Current Motor Truck Models—Continued

NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES		Final Drive	NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES		Final Drive	NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES		Final Drive
				Front	Rear						Front	Rear						Front	Rear	
Kelly-S., K-45	4	\$4550	4 1/2 x 5 1/2	36x5	40x6d	C	O. K., K1	1 1/2	\$2675	4 x 5 1/2	36x3 1/2	36x5	W	Signal, R	5	\$4400	4 1/2 x 6	36x6	40x6d	W
Kelly-S., K-50	5	4900	4 1/2 x 5 1/2	36x6	40x6d	C	O. K., L1	2 1/2	3450	4 1/2 x 5 1/2	36x4	36x8	W	Southern, 10	1	2090	3 3/4 x 5	34x3 1/2	34x4	W
Keystone, 40	2	2450	3 3/4 x 5 1/2	36x6	40x7d	C	O. K., M1	3 1/2	4250	4 1/2 x 5 1/2	36x5	36x5d	W	Southern, 15	1 1/2	2590	3 3/4 x 5 1/2	36x6 1/2	34x4	W
Kimball, AB	2 1/2	3675	4 x 6	36x4	36x7	W	Ogden, A1	1 1/2	2375	3 3/4 x 5	36x3 1/2	36x5	W	Standard, 1-K	1-1 1/2	2090	4 1/2 x 5 1/2	36x6 1/2	40x8*	W
Kimball, AC	3	3975	4 1/2 x 6	36x4	36x8	W	Ogden, E1	2 1/2	2975	4 1/2 x 5 1/2	36x4	36x7	W	Standard, 2	2	1600	3 3/4 x 5	34x3 1/2	34x5*	W
Kimball, AK	3 1/2	4500	4 1/2 x 6	36x4	36x10	W	Old Hickory, W	1 1/2	2175	3 3/4 x 5	36x3 1/2	36x4*	W	Standard, 76	2 1/2	2400	4 1/2 x 5 1/2	36x4*	36x7*	W
Kimball, AE	4	5000	4 1/2 x 6	36x4	40x12	W	Old Reliable, A	2 1/2	2350	4 x 5	34x4	36x6	W	Standard, 66	3 1/2	3150	4 1/2 x 5 1/2	36x5	36x10	W
Kimball, AF	5	5800	5 x 6	36x6	40x7d	W	Old Reliable, B	3 1/2	3500	4 1/2 x 6	36x4	36x4d	W	Standard, 5-K	5 1/2	4400	4 1/2 x 5 1/2	36x6	40x12	W
Kissel, Express	1	1985†	3 3/4 x 5 1/2	31x5†	34x5†	W	Old Reliable, C	5	4250	4 1/2 x 6	36x5	36x5d	W	Sterling, 1 1/2	1 1/2	2885	4 x 5 1/2	36x3 1/2	36x5*	W
Kissel, Utility	1 1/2	1975	3 3/4 x 5 1/2	36x3 1/2	36x5	W	Old Reliable, D	7	5250	4 1/2 x 6	36x6	40x6d	W	Sterling, 2	2	3085	4 x 5 1/2	36x4	36x6	W
Kissel, Freight	2 1/2	2575	4 1/2 x 5 1/2	36x4	36x7	W	Old Reliable, KLM	1	6000	4 1/2 x 6 1/2	36x6	40x7d	C	Sterling, 2 1/2	2 1/2	3290	4 1/2 x 5 1/2	36x4*	36x4d*	W
Kissel, H. D.	4	3675	4 1/2 x 5 1/2	36x5	36x5d	W	Olympic, A	2 1/2	1095	3 1/2 x 5 1/2	35x5†	35x5†	I	Sterling, 3 1/2	3 1/2	4325	4 1/2 x 5 1/2	36x5*	40x5d*	W
Kleiber, AA	1 1/2	2600	4 1/2 x 5 1/2	31x3 1/2	34x5*	W	Olympic, A2	2	3500	3 1/2 x 5 1/2	35x5†	35x5†	W	Sterling, 5-W	5	4950	5 x 6 1/2	36x6*	40x6d*	W
Kleiber, AB	2 1/2	3100	4 1/2 x 5 1/2	36x3 1/2	36x5*	W	Oshkosh, A	2	3750	3 1/2 x 5	36x6†	36x6†	W	Sterling, 5-C	5	5500	5 x 6 1/2	36x6	40x6d	C
Kleiber, BB	3	3600	4 1/2 x 5 1/2	36x4*	36x7*	W	Oshkosh, AA	2 1/2	3850	3 1/2 x 5	36x6†	36x6†	W	Sterling, 7 1/2	7 1/2	6000	5 x 6 1/2	36x6	40x7d	C
Kleiber, B	2 1/2	3950	4 1/2 x 5 1/2	36x5*	36x8*	W	Oshkosh, B	2 1/2	4150	4 x 5 1/2	38x7†	38x7†	W	Stewart, 14	14	1395	3 3/4 x 5 1/2	32x4 1/2†	32x4 1/2†	I
Kleiber, C	3 1/2	4600	4 1/2 x 5 1/2	36x5	36x5d	W	Oshkosh, BB	2 1/2	4300	4 x 5 1/2	38x7†	38x7†	W	Stewart, 15	15	1875	3 3/4 x 5 1/2	35x5†	35x5†	I
Kleiber, D	5	5300	5 x 6 1/2	36x6	40x12	W	Packard, EC	1 1/2-3	3500	4 1/2 x 5 1/2	36x4	36x7	W	Stewart, 7	7	2200	3 3/4 x 5	34x3 1/2	34x5	I
Koehler, D	1 1/2	1935	3 1/2 x 5	34x3 1/2	34x5	W	Packard, EX	1 1/2-3	4000	4 1/2 x 5 1/2	36x6†	40x8†	W	Stewart, 7-X	7	2800	4 1/2 x 5 1/2	34x4	34x7	I
Koehler, M	2 1/2	3175	4 x 5 1/2	36x4	36x7	W	Packard, ED	2-4 1/2	4100	4 1/2 x 5 1/2	36x5	36x5d	W	Stewart, 10	10	2950	4 1/2 x 5 1/2	34x4	34x7	I
Koehler, MCS	2 1/2	3275	4 x 5 1/2	36x4	36x7	W	Packard, EF	4-7 1/2	4500	5 x 5 1/2	36x6	40x6d	W	Stewart, 10-X	10	3850	4 1/2 x 5 1/2	36x5	36x5d	I
Koehler, FT, Trac	3 1/2	4150	4 1/2 x 5 1/2	36x5	36x10	W	Paige, 52-19	2 1/2	2880	4 x 5 1/2	34x3 1/2	31x5	W	Stoughton, C	1	1240	3 1/2 x 5	34x4 1/2†	34x4 1/2†	W
Koehler, MT, Trac	3 1/2	3275	4 x 5 1/2	36x4	36x7	W	Paige, 54-20	2 1/2	3400	4 1/2 x 5 1/2	31x4	31x8	W	Stoughton, A	1 1/2	1995	3 1/2 x 5 1/2	34x4 1/2†	35x5†	W
Lange, B	2 1/2	3350	4 1/2 x 5 1/2	36x4*	36x7*	C	Paige, 51-18	3 1/2	4255	4 1/2 x 5 1/2	36x5	36x5d	W	Stoughton, B	2 1/2	2350	3 3/4 x 5 1/2	36x3 1/2	36x5	W
Larrabee, X-Z	1 1/2	1925	3 1/2 x 4 1/2	34x3†	34x5†	C	Parker, F20	2	3500	4 x 6	34x4	36x4d	W	Stoughton, D	2	2800	4 x 5 1/2	36x4	36x7	W
Larrabee, U	1 1/2	2400	3 1/2 x 4 1/2	34x3†	34x5†	W	Parker, M20	5	5500	4 1/2 x 6	36x6	40x6d	W	Stoughton, F	3	3600	4 1/2 x 5 1/2	36x5d	36x5d	W
Larrabee, K	2 1/2	3200	4 1/2 x 5 1/2	36x4	36x7	W	Patriot, Revere	1	1500	3 1/2 x 5	35x5†	35x5†	W	Sullivan, E	3 1/2	3350	4 1/2 x 5 1/2	36x4*	36x7*	W
Larrabee, L-4	3 1/2	4000	4 1/2 x 5 1/2	36x5	36x5d	W	Patriot, Lincoln	2	2050	4 x 5 1/2	34x3 1/2	34x5	W	Superior, D	1 1/2	4650	4 1/2 x 6	36x5	36x5d	W
Larrabee, W	5	4800	4 1/2 x 6	36x6	40x6d	W	Patriot, Washg'tn	3	2900	4 1/2 x 5 1/2	36x4	36x7	W	Superior, E	1 1/2	1650	3 3/4 x 5	34x4 1/2†	34x4	I
Luedinghaus, C	1	1695	3 1/2 x 5	35x5†	35x5†	W	Piedmont, 4-30	1	1200	3 1/2 x 5	31x4†	31x4†	W	Super Truck, 50	2 1/2	3300	4 x 6	36x4	36x8	W
Luedinghaus, W	2 1/2	2400	3 1/2 x 5 1/2	34x3 1/2	31x5*	W	Pierce-Arrow	2	3200	4 x 5 1/2	36x4	36x4d	W	Super Truck, 70	3 1/2	4300	4 1/2 x 6	36x5	40x5d	W
Luedinghaus, K	1-2 1/2	3150	3 1/2 x 5 1/2	36x4*	36x7*	W	Pierce-Arrow	3 1/2	4350	4 1/2 x 6 1/2	36x5	36x5d	W	Super Truck, 100	5	5300	4 1/2 x 6	36x5	40x12	W
Maccari, L	1 1/2	2700	4 1/2 x 5 1/2	36x4	36x6	W	Pioneer, 59	5	4850	4 1/2 x 6 1/2	36x5	40x6d	W	Super Truck, 150	7 1/2	6300	5 x 6	36x6	40x7d	W
Maccari, H-A	2	3100	4 1/2 x 5 1/2	36x4	36x4d	W	Pittsburgher, C-21	1	1550	3 1/2 x 4 1/2	32x4 1/2†	32x4 1/2†	W	Texas, A38	3 1/2	1095	3 1/2 x 5	33x4	33x4	I
Maccari, H-2	3	3100	4 1/2 x 5 1/2	36x4	36x4d	W	Power, F	3	3800	4 1/2 x 5 1/2	36x5*	36x7*	W	Texas, TK39	1 1/2	1550	3 1/2 x 5	36x6	38x7	W
Maccari, M-2	4	4200	4 1/2 x 5 1/2	36x5	36x5d	W	Power, C	3 1/2	3400	4 1/2 x 5 1/2	36x6	36x6	W	Tiffin, GW	1 1/2	2400	4 1/2 x 5 1/2	36x3 1/2	36x5	W
Maccari, G	5-6	4950	4 1/2 x 6	36x5	40x6d	W	Premcar, B-143	1 1/2	4500	4 1/2 x 5 1/2	36x5	40x10	W	Tiffin, MW	2 1/2	3100	4 1/2 x 5 1/2	36x4	36x3 1/2d	W
MacDonald, A	7 1/2	5750	4 1/2 x 6	36x5	40x6d	W	Rainier, R-21	3 1/2	1990	3 1/2 x 5	35x5†	35x5†	W	Tiffin, PW	3 1/2	4100	4 1/2 x 5 1/2	36x5	40x5d	W
Mack, AB, D.R.	1 1/2	3450	4 x 5	36x4	36x3 1/2d	C	Rainier, R-19	1 1/2	2150	3 1/2 x 5	34x3 1/2	31x4	W	Tiffin, F50	5	4800	4 1/2 x 6	36x6	40x6d	W
Mack, AB	2 1/2	3400	4 x 5	36x4	36x3 1/2d	C	Rainier, R-16	1 1/2	2490	3 1/2 x 5	34x3 1/2	34x5	W	Titan, HT	3 1/2	5000	4 1/2 x 6	36x6	40x12	W
Mack, AB Chain	2 1/2	3000	4 x 5	36x4	36x4d	C	Rainier, R-18	2 1/2	2890	4 1/2 x 5 1/2	34x4	34x6	W	Titan, HD	5	4550	4 1/2 x 6	34x4*	40x5d	I
Mack, AB Chain	3 1/2	3750	4 x 5	36x4	36x4d	D	Rainier, R-20	2 1/2	3550	4 1/2 x 5 1/2	34x4	34x7	W	Titan, TS	2 1/2	5100	4 1/2 x 6	36x5	40x6d	I
Mack, AC Chain	5	4950	5 x 6	36x5	40x5d	C	Rainier, R-15	3 1/2	4400	4 1/2 x 5 1/2	36x5	36x5d	W	Tower, J	1 1/2	3100	4 1/2 x 5 1/2	34x4*	36x4d	I
Mack, AC Chain	5 1/2	5500	5 x 6	36x6	40x6d	C	Rainier, R-17	5	5100	4 1/2 x 6	36x6	36x6d	W	Tower, H	2 1/2	2900	4 1/2 x 5 1/2	35x5	38x7	W
Mack, AC Chain	6 1/2	5750	5 x 6	36x6	40x12	C	Ranger, TK-22-2	2	2775	3 1/2 x 5	36x6†	38x7†	W	Tower, G	3 1/2	3200	4 1/2 x 5 1/2	36x4	36x7	W
Mack, AC Chain	7 1/2	6000	5 x 6	36x7	40x7d	C	Reo, F	3 1/2-11 1/2	1245	4 1/2 x 4 1/2	34x4 1/2†	34x4 1/2†	B	Tower, G	3 1/2	4100	4 1/2 x 5 1/2	36x5	36x5d	W
Mack Trac, AB	5	3400	4 x 5	36x4	36x4d	C	Reliance, 10A	2 1/2	2400	4 x 5 1/2	36x3 1/2	36x5	I	Traffic	1	1595	3 3/4 x 5	34x3 1/2	34x5*	W
Mack Trac, AC	10	5500	5 x 6	36x5	40x5d	C	Reliance, 20B	2 1/2	3100	4 1/2 x 5 1/2	36x4	36x4d	I	Transport, 20	1	1895	3 3/4 x 5	36x4	36x7	I
Mack Trac, AC	13	5750	5 x 6	36x6	40x6d	C	Republic, 75	3 1/2	1395†	3 1/2 x 5	32x4 1/2	32x4 1/2	I	Transport, 30	1 1/2	1395	3 3/4 x 5	34x3 1/2	34x7	I
Mack Trac, AC	15	6000	5 x 6	36x7	40x7d	C	Republic, 10	1	1395	3 1/2 x 5	35x5†	35x5†	I	Transport, 50	2 1/2	1995	3 3/4 x 5	36x3 1/2	36x5	I
Mapleleaf, AA**	2	4150	4 x 5 1/2	36x4	36x7	W	Republic, 10Exp.	1 1/2	1695	3 1/2 x 5	35x5†	35x5†	I	Transport, 70	3 1/2	2785	4 1/2 x 5 1/2	36x4	36x7	I
Mapleleaf, BB**	3	4775	4 1/2 x 5 1/2	36x4	36x4d	W	Republic, 11X	1 1/2	1795	3 1/2 x 5	34x3 1/2	31x5	I	Traylor, B	1 1/2	3885	4 1/2 x 6	36x5	36x10	I
Mapleleaf, CC**	4	5770	4 1/2 x 5 1/2	36x5	36x5d	W	Republic, 19	2 1/2	2155	4 1/2 x 5 1/2	36x4	36x7	I	Traylor, C	2	2390	4 1/2 x 5 1/2	34x3 1/2	34x5	W
Mapleleaf, DD**	5	5770	4 1/2 x 5 1/2	36x5	36x5d	W	Republic, 20	3 1/2	3095	4 1/2 x 5 1/2	36x5	36x10	I	Traylor, D	2	2850	4 x 5 1/2	36x4	36x7	W
Master, JW	1 1/2	6490	4 1/2 x 5 1/2	36x6	40x6d	W	Rowe, CW	1 1/2	3000	3 1/2 x 5	36x6†	36x6†	W	Traylor, E	3	3300	4 1/2 x 5 1/2	36x4	36x8*	W
Master, W	2 1/2	2690	4 1/2 x 5 1/2	34x3 1/2	34x5	W	Rowe, C. D. W.	2	3300	4 x 5	34x4	36x3 1/2d	W	Traylor, F	4	4450	4 1/2 x 6	36x5	40x10	W
Master, D</																				



## Specifications of Current Motor Truck Models—Continued

NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES		Final Drive	NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES		Final Drive	NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES		Final Drive
				Front	Rear						Front	Rear						Front	Rear	
Ward-LaF, 4A	3 1/2	\$4690	4 1/2 x 6 1/2	36x5	36x5d	W	Wichita, RX	2 1/2	\$3600	4 1/2 x 6	36x4*	36x3*	W	Winther, 751	1	\$1795	3 1/2 x 5	34x4 1/2	35x5 1/2	I
Ward-LaF, 5A	5	5590	5 x 6 1/2	36x6	40x6d	W	Wichita, O	3 1/2	4000	4 1/2 x 6	36x5*	36x5d*	W	Winther, 430	1 1/2	2850	3 1/2 x 5	32x4	32x4	I
Watson, E	1	1735	3 1/2 x 5 1/2	35x5 1/2	35x5 1/2	W	Wichita, S	5	5000	4 1/2 x 6	36x6	40x6d	W	Winther, 39	1 1/2	2450	3 1/2 x 5	34x3 1/2	34x5	I
Watson, N	3 1/2	3825	4 1/2 x 5 1/2	36x5	36x10	W	Wilcox, AA	1	1900	3 1/2 x 5 1/2	36x4*	36x4*	W	Winther, 49	2	3250	4 x 5	34x4	34x4d	I
Western, W1 1/2	1 1/2	2550	4 1/2 x 5 1/2	36x3 1/2	36x5*	W	Wilcox, BB	1 1/2	2550	4 1/2 x 5	36x4	36x5	W	Winther, 50	2 1/2	3995	4 x 6	38x7 1/2	42x9 1/2	I
Western, L1 1/2	1 1/2	2550	4 1/2 x 5 1/2	36x3 1/2	36x5*	W	Wilcox, D	2 1/2	3000	4 1/2 x 5	36x4*	36x3 1/2d*	W	Winther, 70	3 1/2	4200	4 x 6	36x5	36x5d	I
Western, W2 1/2	2 1/2	3250	4 1/2 x 5 1/2	36x4	36x7	W	Wilcox, E	3 1/2	3950	4 1/2 x 6	36x5*	36x5d*	W	Winther, 450	2 1/2	3690	4 x 5	34x5	36x6	I
Western, L2 1/2	2 1/2	3250	4 1/2 x 6	36x4	36x7	W	Wilcox, F	5	4350	4 1/2 x 6 1/2	36x5	40x6d	W	Winther, 109	5	5250	4 1/2 x 6	36x6	40x5d	I
Western, W3 1/2	3 1/2	4250	4 1/2 x 6	36x5	40x5d	W	Wilson, F	1 1/2	2270	3 1/2 x 5	36x3 1/2	36x5	W	Winther, 140	7	5900	5 x 6	36x6	40x7d	I
White, 15	3 1/2	2103	3 1/2 x 5 1/2	36x4*	34x5 1/2	B	Wilson, EA	2 1/2	2825	4 1/2 x 5 1/2	36x4	36x7	W	Wisconsin, B	1	1950	4 x 5 1/2	34x5 1/2	34x5 1/2	W
White, 20	2	3250	3 1/2 x 5 1/2	36x4*	36x7	D	Wilson, G	3 1/2	3695	4 1/2 x 5 1/2	36x5	36x5d	W	Wisconsin, C	1 1/2	2500	4 1/2 x 5 1/2	36x6 1/2	36x7*	W
White, 40	3 1/2	4200	4 1/2 x 5 1/2	36x5	40x5d	D	Wilson, H	5	4520	4 1/2 x 6	36x6	40x6d	W	Wisconsin, D	2 1/2	3500	4 1/2 x 6 1/2	36x6	36x10	W
White, 45	5	4500	4 1/2 x 5 1/2	36x6	40x6d	D								Wisconsin, E	3 1/2	4000	5 x 6 1/2	36x6 1/2	36x12*	W
White Hick., E	1	1225	3 1/2 x 5	34x5 1/2	34x5 1/2	W								Witt-Will, N	1 1/2	2750	3 1/2 x 5	36x3 1/2	36x5*	W
White Hick., H	1 1/2	1375	3 1/2 x 5	36x3 1/2	36x5	W								Witt-Will, P	2 1/2	3250	4 1/2 x 5 1/2	36x3 1/2	36x7*	W
White Hick., K	2 1/2	1675	4 1/2 x 5 1/2	36x4	36x5	W								Wolverine, J	1	2125	3 1/2 x 5	34x3	34x4	I
Wichita, K	1	2300	3 1/2 x 5 1/2	36x3*	36x4*	W								Wolverine, J	1 1/2	2375	3 1/2 x 5	34x3 1/2	34x5	I
Wichita, L	1 1/2	2600	3 1/2 x 5 1/2	36x3 1/2	36x5*	W								Wolverine, J	2	2640	3 1/2 x 5	34x4	34x7	I
Wichita, M	2	2800	3 1/2 x 5 1/2	36x3 1/2	36x6*	W								Wolverine, J	2 1/2	3425	4 1/2 x 5 1/2	36x5	36x10	I
Wichita, R	2 1/2	3000	3 1/2 x 5 1/2	36x4*	36x7*	W								Wolverine, L	3 1/2	4100	4 1/2 x 5 1/2	36x5	36x10	I

\*2-cyl. 16-cyl. 18-cyl. All others, not marked, are 4-cyl.

Trac., Tractor. \*\*Canadian made.

Final Drive: W—Worm, I—Internal Gear, C—Chains, D—Double Reduction, B—Bevel, 4—Four-Wheel, E—External Gear.

\*Tires—optional. †Pneumatic Tires. All others solid.

†Price includes body. \$—Price includes several items of equipment.

## Farm Tractor Specifications and Prices

TRADE NAME	Rating	Price	Wheels or Crawlers	Engine	Cylinders: Bore, Stroke	Fuel	Flow Capacity	TRADE NAME	Rating	Price	Wheels or Crawlers	Engine	Cylinders: Bore, Stroke	Fuel	Flow Capacity	TRADE NAME	Rating	Price	Wheels or Crawlers	Engine	Cylinders: Bore, Stroke	Fuel	Flow Capacity
All-In One	16-30	\$1975	3	Clim.	4-5 x 6 1/2	GDK	3-4	Grain Belt... A	18-36	\$2150	4	Wauk.	4-4 1/2 x 6 1/2	G or K	4	Port Huron... A	12-25	\$1500	4	Chief	4-3 1/2 x 6	G, K	3
Allis-Chalm. B	6-12	925	3	LeR.	4-3 1/2 x 4 1/2	Gas.	1	Gray... 1920	18-36	2000	3	Wauk.	4-4 1/2 x 6 1/2	Gas.	4	Ranger Cul.	8-10	.....	4	LeR.	4-3 1/2 x 4 1/2	Gas.	1
Allis-Chalm. G.P.	6-12	795	2	LeR.	4-3 1/2 x 4 1/2	Gas.	1-2	Ground Hog...	19-31	2000	3	Erd.	4-4 x 6	G or K	3	T-20	15-30	1985	4	Wauk.	4-4 1/2 x 6 1/2	G or K	3-4
Allis-Chalm. L	12-20	1350	3	Midw.	4-4 1/2 x 5 1/2	Gas.	2-3	Gr. Western St	20-30	1950	4	Beav.	4-4 1/2 x 6	K	4	Reed... A-1	18-36	2185	4	Wauk.	4-5 x 6 1/2	Gas.	4
Allis-Chalm. M	18-30	2150	4	Own	4-4 1/2 x 6 1/2	GorK	3-4	Hart-Parr... 20	20	945	4	Own	2-5 1/2 x 6 1/2	K, D.	2	Reliable...	10-20	885	4	Own	2-6 x 7	Ker.	2
Allis-Chalm. N	10-18	875	4	Own	4-4 1/2 x 6 1/2	G, K	4	Heider... D	30	1295	4	Own	2-6 1/2 x 7	K, D.	3	Rex...	12-25	1600	4	Wauk.	4-4 x 5 1/2	G or K	3
Allwork... C	14-28	1775	4	Own	4-4 1/2 x 6 1/2	GorK	3	Heider... 30	9-16	1170	4	Wauk.	4-4 1/2 x 6 1/2	G, K	2	Russell...	12-24	1500	4	Own	4-4 1/2 x 6 1/2	G or K	2-3
Andrews Kin. D	18-36	2525	4	Own	4-5 x 6	GorK	4	Heider... C	12-20	1305	4	Wauk.	4-4 1/2 x 6 1/2	G, K	3	Russell...	15-30	2200	4	Own	4-5 x 6 1/2	G or K	3-4
Appleton...	12-20	1500	4	Clim.	4-5 x 6 1/2	GorK	4	Heider... Cult	6-10	1050	4	LeR.	4-3 1/2 x 4 1/2	Gas.	1	Russell...	20-35	3000	4	Own	4-5 1/2 x 7	G or K	4-5
ARO 1921-22	3-5	495	4	Own	1-4 1/2 x 5	Gas.	1	Hicks...	20-30	...	4	Wauk.	4-4 1/2 x 6	K or G	4	Russell...	30-60	5000	4	Own	4-8 x 10	G or K	8-10
Aultman-T...	15-30	2200	4	Clim.	4-5 x 6 1/2	G, K	4	Huber Light 4	12-25	1185	4	Wauk.	4-4 1/2 x 6 1/2	G or K	3	Samson... M	10-20	1250	4	Nor	4-4 x 5 1/2	G, K	2
Aultman-T...	22-45	3420	4	Own	4-5 1/2 x 8	G, K	6	Huber Super 4	15-30	1885	4	Midw.	4-4 1/2 x 6	Gas.	3	Sandusky... J	15-35	1750	4	Own	4-4 1/2 x 6 1/2	G, K, D	2
Aultman-T...	30-60	4500	4	Own	4-7 x 9	G, K, D	8	Illinois, Super	18-30	...	4	Clim.	4-5 x 6 1/2	G, K	4	Sandusky... E	15-35	1750	4	Own	4-5 x 6 1/2	G, K, D	4
Automot. B-3	12-24	1785	4	Herc.	4-4 x 5	G, K	2-3	Drive... C	40-70	4500	4	Own	4-7 1/2 x 9	G, K, D	10	Shawnee Com.	6-12	...	2	LeR.	4-3 1/2 x 4 1/2	Gas.	1
Avery, SR, Cul	5-10	...	3	Own	4-3 x 4	G, K	...	Imperial... E	5-10	895	2	LeR.	4-3 1/2 x 4 1/2	Gas.	1-2	Shawnee Com.	9-18	...	2	Gray	4-3 1/2 x 5	Gas.	1
Avery... Cult-C	5-10	...	3	Own	6-3 x 4	G, K	2	Indiana... F	8-16	900	4	Own	4-4 1/2 x 6	G, K, D	2	Shelby... D	15-30	...	4	Beav.	4-4 1/2 x 6	G, K	3
Avery... B	5-10	...	4	Own	6-3 x 4	G, K	2	International	15-30	1750	4	Own	5-1 1/2 x 8	G, K, D	4	Shelby... C	10-20	...	4	Erd.	4-4 x 6	G or K	2-3
Avery... C	8-16	...	4	Own	2-5 1/2 x 6	G, K, D	2-3	J-T... N	20-40	...	2	Chief	4-4 1/2 x 6	G, K, D	3-4	Short Turn...	20-40	1500	3	Beav.	4-4 1/2 x 6	G, K	3
Avery...	12-20	...	4	Own	4-4 1/2 x 6	G, K, D	2-3	Knudsen 1920	16-32	1475	4	Clim.	4-5 x 6 1/2	...	...	Steady Pull	12-24	1485	4	Own	4-4 x 5	Gas.	3
Avery...	12-25	...	4	Own	2-6 1/2 x 7	G, K, D	3-4	Knudsen 1920	25-45	2500	4	Own	4-5 x 9	Gas.	4-6	Stinson... 4E	18-36	1835	4	Beav.	4-4 1/2 x 6	G, K	4
Avery...	14-28	...	4	Own	4-4 1/2 x 7	G, K, D	4-5	LaCrosse... M	6-12	650	4	Own	2-4 x 6	G, K	1	Stone...	20-40	2250	4	Beav.	4-4 1/2 x 6	G, K	4
Avery...	18-36	...	4	Own	4-5 1/2 x 8	G, K, D	5-6	LaCrosse... C	12-24	985	4	Own	2-6 x 7	G or K	3	Tiegs...	15-27	2625	4	Wisc.	4-4 1/2 x 6	Gas.	3-4
Avery...	25-50	...	4	Own	4-6 1/2 x 7	G, K, D	8-10	Lauson... 5	12-25	1495	4	Own	2-6 x 7	G or K	3	Titan...	10-20	900	4	Own	2-6 1/2 x 8	G, K, D	3
Avery...	45-65	...	4	Own	4-7 1/2 x 8	G, K, D	8-10	Lauson... 20	15-25	1685	4	Midw.	4-4 1/2 x 6 1/2	Gas.	3	Topp...	30-45	3500	4	Wauk.	4-4 1/2 x 6 1/2	Gas.	3-4
Bates...	15-25	...	4	Own	4-4 1/2 x 6	Ker.	3	Lauson... 21	15-30	1985	4	Beav.	4-4 1/2 x 6	G or K	3-4	Toro Cultivator	6-10	...	3	LeR.	4-3 1/2 x 4 1/2	Gas.	2
Bates Mule. H	15-25	...	4	Midw.	4-4 1/2 x 5 1/2	Gas.	3	Lauson Road	15-30	2225	4	Beav.	4-4 1/2 x 6	G or K	3-4	Townsend...	10-20	895	2	Own	4-6 1/2 x 7	Ker.	2-3
Bates Mule. F	18-25	...	2	Midw.	4-4 1/2 x 5 1/2	Gas.	com.	Leader...	12-18	1095	4	Own	2-6 x 6 1/2	G, K, D	2-3	Townsend...	15-30	1485	2	Own	4-7 x 8	Ker.	3-4
Bates Mule. G	25-35	...	2	Midw.	4-4 1/2 x 6	Gas.	com.	Leader... B	16-32	1985	4	Clim.	4-5 x 6 1/2	G, K	3-4	Townsend...	25-50	2750	2	Own	4-8 1/2 x 10	Ker.	4-6
Best...	30	3100	2	Own	4-4 1/2 x 6 1/2	G, K, D	4	Leader... N	16-32	1985	4	Clim.	4-5 x 6 1/2	G, K	3-4	Traction Motor	40-50	...	4	...	8-3 1/2 x 5	Gas.	4-5
Best...	60	5450	2	Own	4-6 1/2 x 8 1/2	G, K, D	8-9	Leader... GU	18-35	2775	2	Clim.	4-5 1/2 x 6 1/2	G, K	3-4	Traylor... T8	6-12	715	4	LeR.	4-3 1/2 x 4 1/2	Gas.	1-2
Boring... 1921	1850	...	3	Wauk.	4-4 1/2 x 5 1/2	GorK	2	Leonard... E	20-30	2530	4	Buda	4-4 1/2 x 6	G, K	3	Triumph... H	18-36	2450	2	Erd.	4-4 1/2 x 6	Ker.	4
Burn-Oil, 1922	15-30	1495	4	Own	2-6 1/2 x 7	Ker.	3-4	Leonard... 40	40	4500	4	Cont.	4-4 1/2 x 6	Gas.	3	Trundar... 13	25-40	3750	2	Wauk.	4-5 x 6 1/2	G or K	4
Capital...	15-30	1000	2	Own	4-4 1/2 x 6	Gas.	3	Linn... HAJ	60	5100	4	Wauk.	4-5 x 6 1/2	Gas.	6	Turner... 1921	14-25	1295	4	Buda	4-4 1/2 x 5 1/2	G, K	3
Case...	10-18	800	4	Own	4-3 1/2 x 5	GorK	2	Linn... W	60	5100	4	Own	4-4 1/2 x 5	K	4	Twin City...	12-20	1580	4	Own	4-4 1/2 x 6	G, K	3
Case...	15-27	1680	4	Own	4-4 1/2 x 6	GorK	3	Little Giant, B	16-22	2200	4	Own	4-4 1/2 x 5	K	4	Twin City...	20-35	3175	4	Own	4-5 1/2 x 6 1/2	G, K	5
Case...	22-40	3100	4	Own	4-5 1/2 x 6 1/2	GorK	4-5	Little Giant, A	26-35	3300	4	Own	4-5 1/2 x 6	K	6	Twin City...	40-6	5250	4	Own	4-7 1/2 x 9	G, K	8
Caterpillar T11	25	3975	2	Own	4-4 1/2 x 6	Gas.	4	Lombard 1921	55-150	...	2	...	6-5 1/2 x 6 1/2	Gas.	16	Uncle Sam C20	12-20	1385	4	Weid.	4-4 x 5 1/2	G	2-3
Caterpillar T16	40	6050	2	Own	4-4 1/2 x 6	Gas.	4	Lombard 1921	50	...	2	...	4-4 1/2 x 6 1/2	Gas.	6-10	Uncle Sam B19	20-30	2300	4	Beav.	4-4 1/2 x 6	G or K	3-4
Centaur...	5-21 1/2	385	2	N Way	2-4 1/2 x 4 1/2	GorK	1	Magnet... 5	14-28	1875	4	Wauk.	4-4 1/2 x 6 1/2	K & G	3	Uncle Sam D21	20-30	1985	4	Beav.	4-4 1/2 x 6	G or K	3-4
Chase...	12-25	1725	3	Wauk.	4-4 1/2 x 5 1/2	GorK	2-3	Master Jr...	5-10	1855	...	LeR.	4-2 1/2 x 4	Gas.	...	Universal...	1-4	475	2	Own	1-3 1/2 x 5	G	1
Chicago... 40	40	2500	4	Own	4-4 1/2 x 6	Gas.	4	Merry Gar1921	2	230	2	Evin	1-2 1/2 x 2 1/2	Gas.	...	Utilitor... 501	24 1/4	380	4	Own	1-3 1/2 x 4 1/2	G	1
Cletrac... F	9-16	845	2	Own	4-3 1/2 x 4 1/2	G, K, D	2	Minne... All-P	12-25	900	4	Own	4-4 1/2 x 7	G or K	3	Victory... 1921	9-18	1350	4	Gray	4-3 1/2 x 5	Gas.	2
Cletrac... W	12-20	1495	2	Own	4-4 x 5 1/2	G, K, D	2-3	Minne. Gen-P	17-30	1675	4	Own	4-4 1/2 x 7	G or K	3-4	Victory... 1921	15-30	1750	4	Wauk.	4-4 1/2 x 5 1/2	Gas.	3
Dakota...	15-27	1500	3	Dom.	4-4 1/2 x 6	Gas.	3	Med.Duty	22-44	3000	4	Own	4-6 x 7	G or K	5-6	Vim... B	15-30	1650	4	Wauk.	4-4 1/2 x 5 1/2	G, K	3
Dart... B.J.	15-30	1800	4	Buda	4-4 1/2 x 6	Gas.	3-4	Minne.	35-70	4150	4	Own	4-7 1/2 x 9	G or K	8-9	Wallis... N	15-25	1600	4	Own	4-4 1/2 x 5 1/2	G, K	3
Deput... D	20	2500	4	Buda	4-4 1/2 x 6	Gas.	3-4	Heavy Duty	35-70	4150	4	Own	4-7 1/2 x 9	G or K	8-9	Waterloo... K	12-25	1450	4	Own	2-6 1/2 x 7	G, K	3
Dill... R.W.	20	2380	4	Cont.	4-4 1/2 x 5 1/2	Gas.	3	Mohawk. 1921	8-16	785	2	Light	4-3 1/2 x 4 1/2	K or G	1-2	Webofoot... 53	23-53	5000	2	Wisc.	4-5 1/2 x 6	G, D	0
Do-It-All... A	3-6	595	...	Own	1-4 1/2 x 5	Gas.	1	Moline Univ D	9-18	900	2	Own	4-3 1/2 x 5	Gas.	2-3	Wellington... B	12-22	...	4	Erd	4-4 x 6	Ker.	2-3
Eagle... F	12-22	...	4	Own	2-7 x 8	GorK	3-4	Moline Orch.	9-18	1075	2	Own	4-3 1/2 x 5	Gas.	2-3	Wellington... F	16-30	...	4	Chief	4-4 1/2 x 6	Ker.	3-4
E-B... AA	12-20	1445	4	Own	2-8 x 8	GorK	4-5	Motor Macul.	1 1/2	195	2	Own	1-2 1/2 x 3 1/2	Gas.	3-4	Western, 1920	16-32	2100	4	Clim.	4-4 x 5 1/2	G, K	4
E-B... Q	12-20	925	4	Own	4-4 1/2 x 5	G, K, D	3	Motex...	15-30	2250	4	Buda	4-4 1/2 x 6	Gas.	3-4	Wetmore 21-22	12-25	1585	4	Wauk.	4-4 1/2 x 6	G, K	4
E-B...	16-32	2080	4	Own	4-5 1/2 x 7	G, K, D	4	NB... 1	3-6	425	4	Own	2-3 1/2 x 4	Gas.	1	Wharton, W.E	12-20	1800	3	Buda	4-4 1/2 x 5 1/2	Gas.	2
Evans...	18-30	2000	4	Buda	4-4 1/2 x 6	G, K	3	Nichols-Shep.	20-42	3100	4	Own	8 x 10	G or K	3-6	Whitney... B	9-18	595	4	Own	2-5 1/2 x 6 1/2	Gas.	2
Fageol... D	9-12	1525	4	Lyc.	4-3 1/2 x 5	Gas.	2	Nichols Shep.	25-50	3400	4	Own	9 x 12	G or K	4-7	Wichita... T	15-30	2000	4	Beav.	4-4 1/2 x 6	G, K, D	3-4
Farm Horse. B	18-30	1885	4	Clim.	4-5 x 6 1/2	G, K	3-4	23-42.	20-42	3100	4	Own	8 x 10	G or K	3-6	Wisconsin... F	16-30	2250	4	Clim.	4-5 x 6 1/2	G or K	3
Farquhar...	15-25	...	4	Buda	4-4 1/2 x 6	G, K, D	3-4	25-50	25-50	3400	4	Own	9 x 12	G or K	4-7	Wisconsin... H	22-40	3200	4	Clim.	4-5 1/2 x 7	G or K	4-6
Farquhar...	18-35	...	4	Own	4-6 x 8	G, K, D	4-5	Nilson Senior...	20-40	2475	5	Wauk.	4-5 x 6 1/2	G, K	4	Yuba... 12-20	12-20	2630	2	Wisc.	4-4 1/2 x 6 1/2	G, K, D	3
Farquhar...	25-50	...	4	Own	4-7 x 8	G, K, D	6-7	Oil Pull... K	12-20	1485	4	Own	2-6 x 8	K, D	3	Yuba... 15-25	15-25	3100	2	Wisc.	4-4 1/2 x 6	G, K, D	4
Fitch... 4	20-35	...	4	Clim.	4-5 x 6 1/2	Ker.	3-4	Oil Pull... H	16-30	2285	4												

# COMING MOTOR EVENTS

## AUTOMOBILE SHOWS

London, Ontario.....	National Motor Show of Western Canada.....	January
New York.....	National Automobile Show.....	Jan. 7-13
New York.....	National Body Builders' Show.....	Jan. 9-14
Buffalo.....	Buffalo Automobile Dealers' Assn.....	Jan. 14-21
Philadelphia.....	Automobile Show.....	Jan. 14-22
Rochester.....	Automobile Show.....	Jan. 16-21
Tulsa, Okla.....	Automobile Show.....	Jan. 16-21
Oakland, Calif.....	Automobile Show.....	Jan. 16-22
Milwaukee.....	Fourteenth Annual Automobile Show.....	Jan. 19-25
San Francisco.....	Automotive Equipment Exposition.....	Jan. 21-27
Cleveland.....	Cleveland Automobile Mfrs. and Dealers' Assn.....	Jan. 21-28
Baltimore.....	Annual Automobile Show.....	Jan. 21-28
Portland, Ore.....	Annual Automobile Show.....	Jan. 23-29
Chicago.....	National Automobile Show.....	Jan. 28-Feb. 3
Chicago.....	Automobile Salon.....	Jan. 28-Feb. 3
Pontiac, Mich.....	Michigan Automotive Trade Assn. Show.....	Feb. 1-4
Minneapolis.....	Tractor Show.....	Feb. 6-11
Minneapolis.....	Automobile Show.....	Feb. 6-11
Winnipeg, Canada.....	Canadian Automotive Equipment Assn. Show.....	Feb. 6-11
Flint, Mich.....	Michigan Automotive Trade Assn. Show.....	Feb. 8-11
Kansas City.....	Kansas City Motor Dealers' Assn.....	Feb. 9-16
Atlanta.....	Southern Automobile Show.....	Feb. 11-18
San Francisco.....	Sixth Annual Pacific Automobile Show.....	Feb. 11-18
Kalamazoo, Mich.....	Michigan Automotive Trade Assn. Show.....	Feb. 14-18
Louisville, Ky.....	Fourteenth Annual Automobile Show.....	Feb. 20-25
Syracuse.....	Fourteenth Annual Automobile Show.....	Feb. 20-25
Grand Rapids, Mich.....	Michigan Automotive Trade Assn. Show.....	Feb. 20-25
Des Moines.....	Winter Automobile Show.....	Feb. 26-March 3
Springfield, Mass.....	Seventh Annual Automobile Show.....	Feb. 27-March 4
Muskegon, Mich.....	Michigan Automotive Trade Assn. Show.....	Feb. 27-Mar. 4
Bay City, Mich.....	Michigan Automotive Trade Assn. Show.....	Feb. 28-Mar. 4
Brooklyn.....	Eleventh Annual Show.....	March 4-11
Saginaw, Mich.....	Michigan Automotive Trade Assn. Show.....	March 6-10
Boston.....	Annual Automobile Show.....	March 11-18
Newark, N. J.....	Newark Automobile Dealers' Assn. Show.....	March 11-18
Port Huron, Mich.....	Michigan Automotive Trade Assn. Show.....	March 15-18
Ypsilanti, Mich.....	Michigan Automotive Trade Assn. Show.....	March 21-22
Ann Arbor, Mich.....	Michigan Automotive Trade Assn. Show.....	March 24-25
Benton Harbor, Mich.....	Michigan Automotive Trade Assn. Show.....	March 28-31
Battle Creek, Mich.....	Michigan Automotive Trade Assn. Show.....	April 2-8

## FOREIGN SHOWS

Calcutta, India.....	Automobile Show.....	Dec. 19-24
Santiago, Cuba.....	Annual Automobile Show.....	March, 1922
Rio de Janeiro, Brazil.....	Automotive Exhibition.....	September, 1922

## CONVENTIONS

Chicago.....	American Road Builders' Convention and Show.....	Jan. 17-20
Chicago.....	Fifth Annual N. A. D. A. Convention.....	Jan. 30-31

## NEWS OF THE SHOWS

### NEW YORK, 92; CHICAGO, 80

Chicago, Dec. 10—A number of changes have been made in the entries for both the New York and Chicago shows. At the present time 92 makes of cars are entered for the New York and 80 for the Chicago section. The Monroe has withdrawn from both shows. The Jackson will show at Chicago only.

### MOOCK ADVOCATES ANNUAL SHOWS

Decatur, Ill., Dec. 9—"Not so much more business, but better business methods," was the keynote of an address delivered before the Decatur (Ill.) Automotive Dealers' Assn. by Harry G. Moock. Seventy employers of the dealers heard the talk, and the remarks were an inspiration to all in attendance. In addition to giving the dealers and their

employees much valuable advice, he urged the association to stage the customary winter show of cars, declaring that any retreat was suicidal. He asserted his belief that the annual show not only stirred up prospects and stimulated their interest in cars, but also put pep into the dealers and their salesmen. It is expected, as a result of the talk by Moock, that Decatur dealers will put on the customary show next February.

### ATLANTA SHOW PROSPECTS GOOD

Atlanta, Ga., Dec. 10—Virgil Sheppard, manager of the 1922 automobile show to be held in Atlanta, Feb. 11-18, under the auspices of the Atlanta Automobile Dealers' Assn., announces that only 1800 sq. ft. of floor space yet remains to be sold. More than 35,000 sq. ft. will be available

for the 1922 show, which will again be held at the Atlanta Auditorium. Of this 23,500 sq. ft. will be devoted to passenger cars, 8000 sq. ft. to trucks and 4000 sq. ft. to accessories.

### CAROLINIANS BANQUET

Columbia, S. D., Dec. 10—The annual banquet of the South Carolina Automotive Assn. was held at Greenville, Dec. 8, following the annual meeting of the association during the day. H. Lee Harvey of Charleston is president of the association. A. M. Lumpkin of Columbia, general counsel of the association, spoke on legislative matters.

### ENCLOSED SHOW BIG SUCCESS

Springfield, O., Dec. 10—Springfield's first enclosed car show was a big success, the dealers state. The hall was well filled each afternoon and evening. Many of the persons who visited the show are considered prospective buyers.

### ROCHESTER SHOW JAN. 16-21

Rochester, N. Y., Dec. 9—This city's fourteenth annual automobile show will be held Jan. 16-21 in the Exposition Park building, under the auspices of the Rochester Automobile Dealers' Assn. E. M. Alling is manager.

### POWER FARMING SHOW

Minneapolis, Dec. 10—Space for the National Tractor and Power Farming Show is being taken at a satisfactory rate and enthusiasm generally is growing. The success of the show now seems assured. The scope of the coming show, Feb. 6-11, is the broadest that has ever been attempted by the association. Power farming in every phase will be demonstrated. Final arrangements for the exposition are now in the hands of committees.

### PHILADELPHIA SHOW DRAWING

Philadelphia, Dec. 9—Drawings for space for the automobile show to be held in the Commercial Museum Jan. 14 to 21, will take place at 1:30 p. m. on Monday, Dec. 12. About 100,000 sq. ft. of floor space are available and all of it, with the exception of a strip at the west end of the main floor and overflow space on the balcony for accessory exhibitors, will be used to display cars.

### OWEN MAGNETIC SALE VOID

Wilmington, Del., Dec. 9—An appeal has been filed in the United States District Court here from the court order granted a few days ago directing a new sale of the personal property of the Owen Magnetic Motor Car Corp., near Wilkes-Barre, Pa. The order refused confirmation of the previous sale, at which \$136,000 was bid by clients of Nathan Bilder, who presented the appeal. Briefs will be filed this week and the decision of the court will be announced later.

In refusing to confirm the sale, Judge Hugh M. Morris held that the order of the court regarding the sale had not been complied with and that the amount of the bid was inadequate.